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ABSTRACT

The packet of 10 curriculum guides, intended to aid in planning and developing materials for the introduction of agribusiness and natural resource education, can be used in statewide educational programs. The guides are appropriate for all levels from elementary to vocational schools and community colleges, although emphasis is on the secondary level. The 10 curriculum guides include the following: (1) agribusiness and natural resource education, (2) animal science, (3) agronomic science, (4) agricultural mechanics, (5) farm business management, (6) agricultural supplies and services, (7) agricultural products-processing and distribution, (8) horticulture, (9) agricultural resources and conservation, and (10) occupational experience in agriculture. Each contains units and problem areas for each topic plus appropriate competencies and learning activities. No indication of the level of instruction is made since the agribusiness and natural resource education guide provides this information. In each of the 10 guides is a list of references with sources of references and instructional aids for the nine topic areas. (LJ)

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CURRICULUM GUIDE IN
AGRIBUSINESS AND NATURAL RESOURCE EDUCATION

CE 004 943

Curriculum Guide

AGRIBUSINESS AND NATURAL RESOURCE EDUCATION

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SOURCE OF CURRICULUM GUIDES

The following ten curriculum guides in agribusiness and natural resources are available as a set from the Department of Public Instruction:

Agribusiness and Natural Resource Education

Animal Science

Agronomic Science

Agricultural Mechanics

Farm Business Management

Agricultural Supplies and Services

Agricultural Products Processing and Distribution

Horticulture

Agricultural Resources and Conservation

Occupational Experience in Agriculture

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Price, $5.00 per set of ten curriculum guides listed above. Please send remittance with order.

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FOREWORD

This curriculum guide is one of ten developed for use by vocational and technical agribusiness instructors in planning instructional programs to meet the needs of their students. Elementary teachers and instructors in other subject matter areas at the secondary level may find the guide of value in introducing principles of career education in their instructional programs. Although much of the material is designed for use at the secondary or postsecondary levels, many of the competencies may be introduced at the awareness or exploratory levels of career education.

Nine committees of instructors and other qualified persons, developed separate guides for teaching animal science, agronomic science, agricultural mechanics, farm business management, agricultural supplies and services, agricultural products processing and distribution, horticulture, agricultural resources and conservation, and occupational experience in agriculture. Units and problem areas with appropriate competencies and learning activities were provided in each guide, but no attempt was made to indicate the level at which the instruction would be provided.

Allocations of problem areas and units, and of instructional time in the four-year sequence of courses at the secondary level are presented in this guide. Also presented are suggested activities involving agribusiness and natural resources for teachers at the kindergarten through sixth grade level, and suggested outlines of subject matter to be included in exploratory programs at the junior high school level. Examples of semester and nine-week courses are also provided.

Curriculum Guide, Agribusiness and Natural Resource Education represents the effort and thought of the 13 committees listed under Committee Organization.

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This curriculum guide represents the best thinking of a select group of vocational agriculture teachers. It is the result of the pooling of knowledge and experience, and much research of curriculum developments in other states, by 22 men enrolled in Ag Ed 593D, Workshop in Curriculum Development in Agribusiness and Natural Resources during June of 1973.

Much credit is due the members of a steering committee which met for three sessions in advance of the workshop to determine the areas to be involved and the format to be followed. The following were members of the steering committee:

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AGRIBUSINESS AND NATURAL RESOURCE EDUCATION

INTRODUCTION

Vocational and technical agriculture instructors are much in need of curriculum guides as they plan instructional programs to meet the needs of their students. The objectives of their programs have been broadened to include competencies related to off-farm agribusiness and natural resource occupations. Great changes have occurred in technology in both production and urban agriculture.

The development of the career education, independent study, modular scheduling, and mini-course concepts have made it necessary for instructors to reevaluate present programs and make adjustments or plan new programs.

No program has previously been recommended as a state program. Each instructor has been, and will continue to be encouraged to provide a program which will meet the agricultural education needs of his potential students. Practically no guidelines have heretofore been provided.

Previous to about 1970, vocational agriculture, like other vocational courses, was taught at the secondary and postsecondary levels quite unrelated to the elementary and junior high schools, and to subject matter included in other disciplines in the secondary school.

Dr. Sidney Marland, former U.S. Commissioner of Education, in 1970 made career education a national priority. This new emphasis, while adding prestige to existing programs of vocational agriculture, implied some changes.

The main purpose indicated of career education was to prepare all students for a successful and rewarding life of work. This could be accomplished by making education more meaningful and relevant to the aspirations of students, improving the basis for career choice, increasing the real choice and alternatives people have among careers and the training avenues open to them, and facilitating the acquisition and transfer of occupational skills. Career education could increase the opportunities and options available to all individuals and could provide educational experiences from early childhood throughout the productive life of an individual.

The model for career development is based on the concept that career education begins in the kindergarten and continues throughout life. It infers that agribusiness and natural resource education may be introduced in the primary and intermediate grades. Pupils at that time begin to analyze themselves and learn about the world of work. Agribusiness and natural resource occupations will be one of several occupational clusters explored in the junior high school. The need for exploratory courses related to agriculture and resource conservation at the seventh and eighth grade levels is evidenced.

Further exploration will be done at the secondary level when the student begins to develop the competencies needed for job entry and occupational employment. Present secondary programs in vocational agriculture must be evaluated in terms of career education needs. There is evidence that many programs may be subject matter oriented and do not provide sufficient opportunities for the students to explore career opportunities in agribusiness and natural resources, or attain the competencies needed in those occupations.

Competencies not acquired in the secondary program must be provided in post-secondary or in young and adult class programs. Many competencies cannot be taught at the secondary level due to lack of maturity and experience of students, and to the inadequacy of needed equipment and facilities.

Workers in agribusiness and natural resources need to update their skills with changes in technology. The career development process should provide these workers with the competencies needed to adjust to such changes in the years ahead.

This guide is intended to serve as an aid in developing curriculum materials in agribusiness and natural resource education at all levels from the kindergarten to adulthood, but with major emphasis on the secondary school program.

ELEMENTARY SCHOOL PROGRAMS

Rationale and Objectives

There is a place for agribusiness and natural resource education in the elementary school. The need is not for organized courses or units, however, but for appropriate relating of agriculture and natural resources to the subject matter commonly taught at the elementary level.

Elementary and vocational agriculture teachers in the schools participating in the Iowa Career Development Project (Sheldon, Shenandoah, Humboldt, Osceola, and Calmar) are enthusiastic concerning their accomplishments.

As a part of career education, elementary teachers are providing opportunities for children to become aware of themselves, physically, mentally, socially and emotionally, and help them develop competencies associated with getting along with others. They also develop in youngsters an appreciation for work and for workers in society. With the development of perception of self and comprehension of the world of work, the learners begin to examine their own self concepts as they relate to selected occupations.

Agribusiness and natural resource teachers can greatly influence instruction at the elementary level. They know agribusiness and natural resources as related to the local and state situations. In most cases the elementary teachers' do not. Teachers of agriculture in the main, can assist elementary teachers in serving as resource persons, as catalysts in providing suggested learning activities, and occasionally as teachers or demonstrators. There are many possibilities for assistance by agribusiness and natural resources students and FFA members.

Suggested learning activities in agribusiness and natural resources for primary and intermediate grade children are presented in the following section.

Learning Activities for Children in the Primary and Intermediate Grades

Animal Science:

1. Sing "Old McDonald Had a Farm."
2. Take field trip to a local farm to identify classes, ages, and sex of animals.
3. Use toys models, and pictures to recognize farm animals.
4. Prepare a collection or display of products made from leather, wool and fur.
5. Prepare a collection or display of food items supplied by animals. (Suggest trip to supermarket, magazine pictures, and labels from food items used in the home).
6. Construct a chart which traces milk from the cow to the carton.

7. Collect items animals use in their diet in producing meat, milk, eggs and wool.
8. Identify common breeds. (Most children realize there are red, yellow, black and white people. Use this approach to explain differences in animals).
9. Take field trip to meat, dairy, and egg processing plants.
10. Hear the Thanksgiving story; then visit a local turkey farm.
11. Take a field trip to a local hatchery.
12. Construct a miniature ferris wheel for baby chicks. (Use Vo-Ag students as resource persons).
13. View slides of different stages of growth from newborn offspring to mature animal.
14. Invite various people employed in the animal industry to present information regarding their jobs.
15. Observe a sheep shearing demonstration.
16. Arrange a farmstead with toy models.
17. Play with model farm buildings including shelters and equipment used in animal production.
18. Invite a horseman to show some common body parts of a horse, horse equipment, and safety measures needed in handling and riding a horse.
19. Take a field trip to observe a dairy milking operation.
20. Observe a cow chewing a cud.
21. Hatch eggs to study the process of life for chickens. Compare with live births from small animals in the classroom (hamsters, mice, rabbits, etc.).
22. Learn about proper care of animals from herdsmen, etc., in the community and apply to their pets at home.
23. Have resource people in agricultural related occupations discuss their jobs to make the students aware of the world of work. (Start with farmer).

Note: The FFA members in the high school would be very helpful in teaching students in K-6 about agriculture and in the above listed activities.

Agronomic Science:

1. Class trip to a grocery store to identify end-products from different crops.
2. Pupils analyze the migration of the farm population in the local community by counting vacant farmsteads in the county plat book.
3. Field trip to crop processing plant in the community.
4. Bring labels of various products from home which are crop derivatives and study the sources.
5. Bring to class as many different crop seeds as they can find, plant in flats, and watch them grow.
6. Trip to a wooded area to identify plants that are irritants to man, such as poison ivy and poison oak.
7. Invite various employees from agronomic industries to discuss their jobs.
8. Germinate seed in class and identify the stages of growth.
9. Dissect the flowers from various types of plants, identify the parts and discuss the functions of each part.
10. Conduct experiments in the classroom on photosynthesis while controlling temperature, moisture and light.
11. Perform experiments on transpiration using food coloring in the water.
12. Study the parts of different seeds under a magnifying glass.
13. Conduct a plant growing contest using different rates of fertilizer in classroom flats.
14. Collect field samples of insects, identify in class and mount.

15. Field trip to collect crop plants and tree leaves, identify in class and mount.
16. Field trip to local grain elevator to see grain being graded, handled and shipped.
17. Visit a seedcorn plant and observe grading, treating, bagging and shipping.
18. Field trips to observe various crop planting methods in the community.
19. Visit a machinery dealer in the community to identify the different types of agricultural machinery.
20. Take soil samples of extremely different areas and analyze the nutrient content with portable soil test kits.
21. Visit an outstanding farmer in the community to see modern equipment and facilities in use, and then have a retired farmer show old equipment that he used.
22. Students measure different shaped fields and storage structures and figure the areas and the volumes.
23. Collect and study labels of pesticides used at home for contents, usage and safety precautions.
24. Check the crop losses of a harvesting machine and estimate the dollar value to the farmer and the community.
25. Visit a local chemical dealer and discuss chemical usage and its effect on the environment.
26. Conduct a weed survey in soybeans and estimate the economic loss to the producer and the community.

Agricultural Mechanics:

1. Identify hand tools.
2. Construct and mount birdhouses.
3. Field trip to lumber yard.
4. Examine the growth of a tree stump.
5. Make a display of kinds and sizes of nails.
6. Make a display of lumber samples - 1" x 2", 1" x 3", etc.
7. Build a model farmstead.
8. Make a display of building materials.
9. Display toy tractors and implements in the classroom.
10. Field trip to concrete ready-mix plant.
11. Build a model house using model bricks.
12. Measure lumber samples.
13. Display objects cast of metal.
14. Prepare an exhibit or collage of agricultural mechanics at work.
15. Organize a manufacturing company and make cardboard plyboard sheets.
16. Construct a model community using plyboard sheets manufactured by the Classroom Manufacturing Company.
17. Construct a working model electric motor.
18. Field trip to observe concrete construction.
19. Mix concrete and cast small objects using a prepared concrete mix.
20. Make a list of the agricultural mechanics jobs in the community.
21. Using small gauge wire, construct a classroom model of an agricultural machine.
22. Construct a model livestock feeding operation.
23. Construct a working model irrigation system (using plastic hose) for classroom plants.
24. Construct electric circuits in a model house using flashlight batteries and bulbs.
25. Hold a model tractor operator's contest.

26. Field trip to observe old farming machinery.
27. Field trip to observe farming operations.
28. Contest - pounding small nails without bending (wear eye protection).
29. Agricultural mechanics worker dress-up day.
30. Display posters of how farm workers should practice safety when using machinery.

Farm Business Management:

1. View specialized livestock operations and talk with the manager.
2. Field trip to a general farm operation.
3. View a crops farm operation.
4. Visit a bank and talk with the farm loan advisor.
5. Field trip to observe a farm custom machine operation.
6. Develop a personal budget for self for a month, and keep a record of income and expenses.
7. Visit a single-owner farm business and a cooperative and talk with the managers.
8. Visit local, state, and federal government agencies and their projects in the area.
9. Devise a promotional poster for pork, beef, milk, eggs, grain, wool, or poultry as a contest.
10. Visit a sale barn.
11. Set up a model farm in the classroom and assign "management" tasks to each student.
12. Visit a vocational agriculture farm management class.
13. Vocational agriculture teacher present a talk on farm management.

Agricultural Supplies and Services:

1. Teacher visit a feed store to pick up examples of pelleted protein feed, loose salt, mineral, and beet pulp or bran. Other prepared feeds could also be used. Take samples to class as a motivator in starting a discussion on the nutrients farmers feed their animals and who sells them the feed. The same example could be used for a discussion on "fertilizers in making plants grow." Fertilizer samples may be obtained from a local fertilizer plant.
2. Have a class "pet day" asking pupils to bring their pets to class. Use examples of feeding, caring for, litter, and housing of pets to relate the farmer's care of livestock and who sells him the products he needs. The goldfish in a bowl could be compared to a pig on the farm.
3. During this same "pet day" have students recognize symptoms of illness in pets which would be the same as for farm animals. Discuss products that keep these animals well and where are they obtained.
4. Obtain cooperation of a local farm supply center who will provide a coloring book for pupils. This book would provide pictures of various farm supply sales and service occupation scenes.

Agricultural Products Processing and Distribution

1. Take field trips to observe the industry facilities, machinery in operation, jobs in the industry, and products used and manufactured in the industry.
2. Bring samples of the raw materials and finished product to the class from home or the industry for observation and discussion. (Example - corn grain, ground corn, corn manufactured into human food such as corn flakes, corn curls, corn meal, etc.).
3. Methods and equipment available may enable the instructor to have students process the product or prepare some food item.

4. Films and slide sets on the industry, industrial processes, working conditions, etc., would be of value in giving understandings of the industries.

Horticulture:

1. Collect leaf specimens, press and name.
2. Each child will draw a picture of an insect which could attack plants.
3. Make a terrarium out of a pint jar containing two or three plants.
4. Construct a mini-greenhouse out of plastic, coat hangers and small wooden box. Plant and grow seeds in the classroom.
5. Build a box with one glass side. Have pupils plant seeds next to glass side (be sure glass side is covered). Pupils can then observe root growth.
6. Tour a local greenhouse.
7. Establish a small garden on the school grounds. Have pupils do some of the planting, maintenance and harvesting of the plants.
8. Provide each pupil with a plant and have him develop a story around it.
9. Give pupils different types of seeds and have them make seed pictures. (Example - flowers, birds, etc.).
10. Each pupil could have their own personal garden plot.
11. Cook a simple meal using vegetables taken from garden.
12. Make things from plants grown in the garden. (Example - bowls from gourds and arrangements from flowers).
13. Show the historical and cultural aspects of vegetables by having children prepare and use them as the pioneers and as Indians did.
14. Make use of media (films, slides, etc.) in teaching of vegetables.
15. Have each child make cuttings and grow them into new plants.
16. Organize a junior horticulture club.

Natural Resources and Conservation:

1. High school conservation class could develop an outdoor conservation classroom which would provide aids to elementary teachers. For example:
    - Small pond or lake
    - Weather station
    - Sundial
    - Birdfeeders and bath
    - Wildflower plantings
    - Native prairie grass plantings
    - Wildlife food plantings
    - Christmas tree plantation
    - Soil profile exhibit
    - Beehive
    - Log pile
    - Rock pile
    - Poisonous plant area
    - Erosion test plot
    - Fern beds
    - Tree species
2. Sponsor an elementary conservation field day with county conservation workers and use conservation class members as station leaders. Stations might include soil profiling, natural grasses, tree identification, soil erosion, wildlife food and cover, windbreaks, tree belts and living fences.
3. FFA chapter sponsor an "appreciation for natural resources" poster contest for elementary grades.

4. Elementary students collect trash from 1/100th of an acre, weigh it, measure volume and make projections for one acre, five acres and for the total town area.
5. Take elementary field trips to area farm ponds, game reserves, and to picnic and campgrounds to teach appreciation of natural resources and wise uses of them.
6. Participate in governor's Arbor Day. Elementary students start tree seeds in classroom then take seedlings home to be planted.
7. Arrange for Iowa Conservation Commission Wildlife Exhibit truck to visit the school district.
8. Plant natural grasses in flats in the classroom.

Occupational Experience:

1. Pupils compile a list for a bulletin board display of names of local citizens employed in agricultural occupations.
2. Progress in agriculture may be studied with pupils collecting antiques, pictures, or clippings as a class contest. (Show and tell project).
3. In cooperation with the vocational agriculture department, pupils could tour the farming program of a recent Iowa or American Farmer in FFA.
4. Pupils gather clippings or take pictures of persons employed in agricultural jobs and farming activities to present in a notebook. A field trip at this time would encourage the use of a camera.
5. Upper elementary pupils can write news articles concerning jobs, farms or other occupational information following a field trip. These articles could be used in the local paper or the class could publish their own paper.
6. Pupils could role play to demonstrate work, employee attitude, and human relationships associated with specific occupations.
7. During a field trip to an agribusiness or farm, assign the pupils to note good and poor quality workmanship and working conditions.
8. Pupils in rural communities may be aware of the use of large machines and chemicals. Field trips to specifically show their use will increase their awareness; equally important during these demonstrations is the instruction of safely procedures and implications.
9. Pupils are beginning to realize in elementary school the realm of agricultural mechanics. High school students, under supervised instruction, could provide small group demonstrations of tools, their uses, and safety precautions.
10. Each FFA member provide an elementary pupil a tour of his farm or agribusiness.

JUNIOR HIGH SCHOOL PROGRAMS

Rationale and Objectives

Research has shown that experiences in the elementary and middle schools may be closely related to future occupations of the individual. Occupational exploration at these levels broadens the understanding of the individual of the world of work and may direct his interests toward tentative vocational areas and goals. It is understood that the occupational aspirations are only tentative. Adolescents normally are not able to make a solid and specific decision regarding vocational intent. An opportunity to explore the world of work and discover areas of interest justifies change in the instructional program at the junior high level.

In the exploration phase of career development in the middle school, the learner begins to explore his real interests, aptitudes, and desires, and the occupational clusters that comprise the world of work. During this phase of his development he recognizes the educational setting as a place to gain direction and skills needed for the development of career goals. He considers his developing maturity as continually influencing his perception of educational needs. He examines the behaviors and life styles relating to the organization of the world of work. Careers are explored and he learns that skill perception is related to career selection and change.

Educational experiences provided during this phase of career development prepares the individual to assess and pursue the career options open to him. By careful screening and selection, he will be able to choose those high school courses which relate to his personal attributes, satisfactions and career knowledge. As a result of these experiences, he begins the process of selecting an occupational area for which to prepare for job entry.

The images of farming and of agriculture need clarification. To many, the terms are synonymous. Youngsters from both the farm and the city should have an opportunity to develop an understanding of the interrelationships between the farm and urban peoples and businesses. They need to become knowledgeable concerning the principles involved in food production, processing and distribution. They need to consider these principles as applied in the local community, to the state, the nation, and in international situations.

Farming and off-farm agricultural businesses involve 30 to 40 percent of the labor force. It is important that youth understand the opportunities in these occupations. It is also important the youth with agricultural backgrounds, whether acquired on the farm or in off-farm agricultural businesses and industries, be encouraged to capitalize on those backgrounds by preparing for and engaging in agricultural occupations.

Following is a list of competencies to be attained by students enrolled in exploratory course in agribusiness and natural resources:

Competencies - students will be able to:

1. Recognize the contribution of farming and urban agriculture to the welfare of the nation and of the individual.
2. Distinguish the interdependence of the agricultural and nonagricultural segments of American industry.
3. Explain the factors involved in food production, processing and distribution.
4. Recognize and explain the place of agriculture in the world of work.
5. Identify and describe the specific employment opportunities in agriculture available in the local community, in the state and in the nation.
6. Determine and explain the experience and educational preparation necessary for employment in various occupations.
7. Distinguish the place of vocational agriculture at the high school and area vocational-technical school levels, and of the colleges of agriculture in the pareparation of individuals for employment.
8. Describe the contribution of the FFA to the educational development of members.
9. Demonstrate abilities in leadership and in agriculture which may be springboards of interest for continuing education in agriculture.
10. Describe the need for conservation of natural resources related to agriculture and recreation.

Examples of Exploratory Programs

Exploratory agriculture may be provided in specialized courses at the 7th or 8th grade levels, or included in a careers exploration course involving other areas of occupational education. Instructors will find the nine agribusiness and natural resource special topic guides helpful in determining competencies and learning activities to include in local programs. Following are examples of 9-, 12-, and 18-week courses in exploratory agriculture:

9-Week Course

Unit	Days
Economic Contribution of Agriculture	5
Employment Opportunities in Agriculture	5
Educational Opportunities in Agriculture	5
Leadership Development	5
Animal Science	5
Plant and Soil Science	5
Agricultural Mechanics	5
Conservation of Agricultural Resources	5
Farm and Home Beautification	5
	45 days

12-Week Course

Unit	
Economic Contribution of Agriculture	5
Farm-City Relationships	5
Employment Opportunities in Agriculture	5
Educational Opportunities in Agriculture	5
Leadership Development	5
Personal Finance	5
Animal Science	5
Plant and Soil Science	5
Agricultural Mechanics	5
Home Safety	5
Conservation of Agricultural Resources	5
Farm and Home Beautification	5
	[illegible]0 days

18-Week Course

Unit	
Economic Contribution of Agriculture	10
Farm-City Relationships	5
Employment Opportunities in Agriculture	5
Educational Opportunities in Agriculture	5
Leadership Development	10
Personal Finance	5
Large Animal Science	10
Small Animal Science	5
Crop and Soil Science	5

(continued)

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80

(continued)

Agricultural Mechanics	5
Home Safety	5
Conservation of Agricultural Resources	10
Horticulture	5
Farm and Home Beautification	5
	90 days

SECONDARY SCHOOL PROGRAMS

Rationale and Objectives

Secondary programs in agribusiness and natural resource education must provide for both exploration of career opportunities and skill development. With some students the secondary program will be largely exploratory; with others it will be largely skill development. Those who will continue formal education by enrolling in a technical school, junior college or university, will place more emphasis on exploration and competencies associated with exploration, whereas those who have entered the world of work, or will do so upon graduation, are concerned in the main with employment skills.

Since instructors find both types of students in their classes, provision must be made to meet their needs. This is more difficult to do in a one-man department than in a multiple-man department. A common procedure is to provide a two- or three-year core program for all students and encourage students to enroll in mini or semester specialized courses during the remaining year or years. Independent study and variations in occupational experience programs will aid in meeting the needs of individual students.

The content of core programs will and should vary with the community. The needs of students, needs of the community, facilities available and instructional personnel available should determine course content. An advisory committee may be very helpful in developing curriculum materials.

The separate guides developed for the nine subject matter areas (Animal Science; Agronomic Science; Agricultural Mechanics; Farm Business Management; Agricultural Supplies and Services; Agricultural Products, Processing and Distribution; Horticulture; Agricultural Resources and Conservation; and Occupational Experience in Agriculture) may be used in determining content of core courses and of the mini or semester courses.

It is assumed that appropriate farming and other occupational experience programs will supplement formal classroom and laboratory instruction. An active FFA chapter with a well balanced program of activities is also assumed.

Two-Year Secondary Core Program
in
Agribusiness and Natural Resources

The following example of a two-year core program permits the student to attain basic competencies in production agriculture and natural resources during the first two years, and enroll in specialized semester or nine-week courses during the junior and senior years. The example is only suggestive and should be modified to meet local needs. The two-year core program is perhaps best suited to multiple-man departments with large enrollments. Space is provided in the example for the instructor to allocate time to be devoted to the various units and problem areas in his local program by years.

Examples of semester and nine-week courses are presented in another section of this guide. The number and titles of semester and nine-week courses offered will be determined by student needs, available staff, facilities and enrollments.

	Time Allocation					
	Example Days			Local Program Days		
Units	Ag 1	Ag 2	Total	Ag 1	Ag 2	Total
Orientation	4	3	7			
Overview of Agriculture Industry	5		5			
FFA	20	10	30			
Occupational Experience						
Planning a Career	6		6			
Locating an Agricultural Opportunity & Entering an Occupation						
Orientation to an Occupation						
Importance of the Individual						
Legal Considerations - Farm & Nonfarm						
Occupational Success						
Farming Program & Personal Finance	20	10	30			
Animal Science						
Livestock Industry	5		5			
Animal Nutrition	10		10			
Animal Breeding	5		5			
Beef Cattle	12		12			
Dairy Cattle	12		12			
Horses	5		5			
Poultry	7		7			
Sheep	12		12			
Swine	12		12			
Agronomic Science						
Agronomic Opportunities: Economic & Occupational		2	2			
Soil Properties		10	10			
Soil Management		10	10			
Fertilizers		10	10			
Plant Growth		5	5			
Oat and Other Small Grain Production		10	10			
Corn Production		20	20			
Soybean Production		15	15			
Forage Production: Hay, Pasture & Silage		15	15			
Pests of Agricultural Crops: Insects, Diseases and Weeds		15	15			
Agricultural Mechanics						
Opportunities in Agri. Mechanics	2		2			
Carpentry & Wood Construction	20		20			
Concrete & Concrete Masonry		5	5			
Electricity - Wiring, Controls & Motors						
Farmstead Planning, Farm Service Center & Farm Structures		2	2			
Farm Power & Machinery Operation & Maintenance		15	15			
Making & Reading Working Drawings	1	1	2			
Safety	2	2	4			
Storage & Materials Handling						
Welding & Metals	20	20	40			
Totals	180	180	360			

Three-Year Secondary Core Program in Agribusiness and Natural Resources

The example three-year program should be modified to meet local needs. The guide is designed to provide during the first three years, the basic concepts of agribusiness and natural resource technology. During the fourth year, the student may concentrate on areas of special interest.

The number and titles of semester and nine-week courses to be offered will be determined by student interests and needs, available staff, facilities and potential enrollment. Examples of semester and nine-week courses are presented in another section of this guide.

Space is provided in the example for the instructor to allocate time to be devoted to the various units and problem areas in his local program by years.

	Time Allocation					
	Example Days			Local Program Days		
Units	Ag 1	Ag 2	Ag 3	Ag 1	Ag 2	Ag 3
Orientation	2	2				
Overview of Agriculture Industry	2					
FFA	16	10	5			
Occupational Experience (Total)	15	5	15			
Planning a Career	5					
Locating an Agricultural Opportunity & Entering an Occupation	2					
Orientation to an Occupation						
Importance of the Individual		5				
Legal Considerations-Farm & Nonfarm			5			
Occupational Success						
Farming Program & Personal Finance	8		10			
Animal Science (Total)	100	15	10			
Livestock Industry	5	5	2			
Animal Nutrition	15	10	3			
Animal Breeding	10		5			
Beef Cattle	15					
Dairy Cattle	15					
Horses	7					
Poultry	3					
Sheep	10					
Swine	20					
Agronomic Science (Total)	10	100	10			
Agronomic Opportunities: Economics & Occupational		5				
Soil Properties		15				
Soil Management		15				
Fertilizers		10	5			
Plant Growth	2	5				
Oat & Other Small Grain Production		5				
Corn Production	5	15				
Soybean Production	3	15				
Forage Production: Hay, Pasture & Silage		5				
Pests of Agricultural Crops: Insects, Diseases and Weeds		10	5			

	Time Allocation					
	Example Days			Local Program Days		
Units	Ag 1	Ag 2	Ag 3	Ag 1	Ag 2	Ag 3
Agricultural Mechanics (Total)	35	40	40			
Opportunities in Agri. Mechanics						
Carpentry & Wood Construction	25					
Concrete & Concrete Masonry			10			
Electricity - Wiring, Controls & Motors			10			
Farmstead Planning, Farm Service Center & Farm Structures						
Farm Power & Machinery Operation & Maintenance		9	20			
Making & Reading Working Drawings	5					
Safety	5	1				
Storage & Materials Handling						
Welding & Metals		30				
Farm Business Management (Total)		5	100			
Occupational Opportunities			3			
Credit & Total Money Management			20			
Records & Record Analysis			20			
Farm Business Organization		5				
Government Agencies & Farm Organizations			5			
Marketing Management			20			
Machinery Management			10			
Labor Management			7			
Real Estate Appraisal: Lease or Purchase			5			
Risk Management			5			
Estate Planning			5			
Agricultural Supplies and Services						
Opportunities in Agricultural Supplies & Services						
Human Relations						
Salesmanship						
Business Procedures & Records						
Business Management						
Product Knowledge of Agricultural Supplies						
Business Law						
Agricultural Products Processing & Distribution						
Occupational Opportunities						
Dairy Processing						
Egg Processing						
Grain Processing & Grain By-Products						
Meat Processing & Meat By-Products						
Wool Processing & Other Fiber Products						
Vegetable & Fruit Processing						
Horticulture						
Opportunities in Horticulture						
Horticultural Plant Classification & Growth						
Pomology						
Oleoriculture						
Floriculture						
Arboriculture						
Lawn & Turf Management						

	Time Allocation					
	Example Days			Local Program Days		
Units	Ag 1	Ag 2	Ag 3	Ag 1	Ag 2	Ag 3
Greenhouses						
Horticultural Mechanics						
Business Procedures						
Landscaping						
Agricultural Resources & Conservation (Total)		3				
Agricultural Resource Opportunities						
Air Resource Management						
Fish Management						
Forest Resource Management						
Land Use Planning						
Outdoor Recreation Planning						
Soil Conservation		3				
Water Resource Management						
Wildlife Management						
Total Days - 3-Year Program	180	180	180	180	180	180

Four-Year Secondary Program in Agribusiness and Natural Resources

It is assumed that the example four-year program will be modified to meet the needs of the local community. Semester and nine-week courses may be offered if staff, facilities, and enrollments are available. These courses would permit a student to earn more than one credit in agribusiness and natural resource education in one semester. Such courses would deal intensively with units and problem areas not adequately covered in the core program. Examples of these courses are presented in another section of this guide. The four-year program may be preferred by the administrators and teachers in one-teacher departments with limited enrollments.

Space is provided in the example for the instructor to allocate time to be devoted to the various units and problem areas in his local program by years.

	Time Allocation									
	Example Days					Local Program Days				
Units	Ag 1	Ag 2	Ag 3	Ag 4	T	Ag 1	Ag 2	Ag 3	Ag 4	T
Orientation	1	1	1	1	4					
Overview of Agriculture Industry	5	2		4	11					
FFA	20	15	5	5	45					
Occupational Experience (Total)	25	10	5	42	82					
Planning a Career	3			5	8					
Locating an Agricultural Opportunity & Entering an Occupation	2			5	7					
Orientation to an Occupation	5	5		15	25					
Importance of the Individual	5			2	7					
Legal Considerations-Farm & Nonfarm				5	5					
Occupational Success				5	5					
Farming Program and Personal Finance	10	5	5	5	25					

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	Time Allocation									
	Example Days					Local Program Days				
Units	Ag 1	Ag 2	Ag 3	Ag 4	T	Ag 1	Ag 2	Ag 3	Ag 4	T
Animal Science (Total)	62	35	15	10	122					
Livestock Industry	2				2					
Animal Nutrition	5	5	5		15					
Animal Breeding	5	7	5	5	22					
Beef Cattle	15	10		5	30					
Dairy Cattle	5				5					
Horses	3				3					
Poultry	2				2					
Sheep	5	3			8					
Swine	20	10	5		35					
Agronomic Science (Total)	27	80	10		117					
Agronomic Opportunities: Economic and Occupational	2	5			7					
Soil Properties		15			15					
Soil Management		10			10					
Fertilizers		15			15					
Plant Growth	10				10					
Oat & Other Small Grain Production		5			5					
Corn Production	10	15			25					
Soybean Production	5	10			15					
Forage Production: Hay, Pasture & Silage			5		5					
Pests of Agricultural Crops: Insects, Diseases and Weeds		5	5		10					
Agricultural Mechanics (Total)	40	22	60	10	132					
Opportunities in Agricultural Mechanics	5				5					
Carpentry & Wood Construction	25				25					
Concrete & Concrete Masonry			5		5					
Electricity - Wiring, Controls & Motors			10		10					
Farmstead Planning, Farm Service Center & Farm Structures				5	5					
Farm Power & Machinery Operation & Maintenance			40		40					
Making & Reading Working Drawings	5				5					
Safety	5	2			7					
Storage & Materials Handling				5	5					
Welding & Metals		20	5		25					
Farm Business Management (Total)			64	63	127					
Occupational Opportunities				2	2					
Credit & Total Money Management				20	20					
Records & Record Analysis			20	10	30					
Farm Business Organization				5	5					
Government Agencies & Farm Organizations				3	3					
Marketing Management				10	10					
Machinery Management			25		25					
Labor Management				3	3					
Real Estate Appraisal: Lease or Purchase			19		19					
Risk Management				5	5					
Estate Planning				5	5					
Agricultural Supplies & Services (Total)				45	45					
Opportunities in Agricultural Supplies & Services				5	5					

	Time Allocation									
	Example Days					Local Program Days				
Units	Ag 1	Ag 2	Ag 3	Ag 4	T	Ag 1	Ag 2	Ag 3	Ag 4	T
Human Relations				5	5					
Salesmanship				10	10					
Business Procedures & Records				10	10					
Business Management				5	5					
Product Knowledge of Agri. Supplies				5	5					
Business Law				5	5					
Agricultural Products Processing & Distribution (Total)										
Occupational Opportunities										
Dairy Processing										
Egg Processing										
Grain Processing & Grain By-Products										
Meat Processing & Meat By-Products										
Wood Processing & Other Fiber Products										
Vegetable & Fruit Processing										
Horticulture (Total)		15			15					
Opportunities in Horticulture		1			1					
Horticultural Plant Classification & Growth		5			5					
Pomology										
Oleoriculture										
Floriculture										
Arboriculture										
Lawn & Turf Management		4			4					
Greenhouses										
Horticultural Mechanics										
Business Procedures										
Landscaping		5			5					
Agricultural Resources & Conservation (Total)			20		20					
Agricultural Resource Opportunities										
Air Resource Management										
Fish Management										
Forest Resource Management										
Land Use Planning			10		10					
Outdoor Recreation Planning										
Soil Conservation			10		10					
Water Resource Management										
Wildlife Management										
Total Days - 4-Year Program	180	180	180	180	720	180	180	180	180	720

YOUNG FARMER AND ADULT EDUCATION PROGRAMS

Rationale and Objectives

Normally nine to ten percent of Iowa farmers are enrolled each year in young and adult farmer classes offered by local vocational agriculture departments. Some are enrolled in adult classes offered by area schools, community colleges and by the Cooperative Extension Service. Approximately 2,500 veterans are participating in farm training programs for veterans offered by the area schools and community colleges. Many of these men are classified as young farmers. Iowa has about thirteen thousand young farm operators. With the emphasis placed on adult education by career education administrators, it is possible that much effort will be extended during the next five years to reach a larger percentage of farm operators and workers.

The fact that only about ten percent have participated in young and adult farmer education programs reflects on the instruction offered. Adult education is entirely voluntary. The subject matter must be of interest and meet their needs or the farmers do not attend.

Very little has been done to provide inservice instruction to persons employed in off-farm agribusiness. This has been due in part to the fact that in many small towns and communities there have been too few persons employed in the separate occupations to justify a class. These workers have educational needs. The needed instruction can perhaps best be provided by area vocational-technical schools or community colleges.

Vocational agriculture instructors have given very little attention in past years to conservation of natural resources other than to soil conservation. This is especially true in adult education. This is a high priority area in present day education.

Following is a summary of the objectives of agribusiness and natural resource education for adults:

1. Provide continuing education needed by hired farm workers in order for them to be more efficient and satisfied in their employment, and improve their eligibility for advancement.
2. Provide continuing education for young and other beginning farm operators which will aid them in solving the financial, technological and management problems peculiar to beginning farmers.
3. Provide continuing education for farm operators with special emphasis on farm business management, record keeping and analysis, and new developments in agricultural technology.
4. Provide educational programs to acquaint landlords concerning leasing, landlord-tenant relationships, and new developments in farm technology.
5. Provide educational programs needed by workers in off-farm agribusinesses which will improve their occupational efficiency, job satisfaction, and opportunities for advancement.
6. Provide continuing education program in agricultural resources and conservation for both rural and urban adults.

Guidelines in Curriculum Development

The following guides will be helpful in organizing instructional programs in agribusiness and natural resources for adults:

1. The curriculum guides developed for the nine subject matter areas (Animal Science, Agronomic Science, Agricultural Mechanics, Farm Business Management, Agricultural Supplies and Services, Agricultural Products Processing and Distribution, Horticulture, Agricultural Resources and Conservation, and Occupational Experience in Agriculture) provide suggestions for unit courses, problem areas for special class sessions, and learning activities which may be adapted in planning adult education programs.
2. The semester and nine-week courses included in this guide may serve with adaptations as the basis for unit courses, or may suggest topics to be included in a current topics series of meetings.

3. Much use should be made of advisory groups in curriculum planning. Care should be taken to see that committee members are those persons best qualified to assist with curriculum planning. Committee members respond best when the instructor presents several alternative topics or programs.
4. Local instructors should work with cooperative extension, area schools (area vocational schools and area community colleges), and with farm and industrial personnel in developing adult education programs.
5. Care should be taken to avoid duplication of programs.
6. Local instructors should include in their programs the problem areas best suited to the needs of potential enrollees and obtain resource persons as needed.
7. Young and adult farmer education should be provided year-round with a concentration of meetings during the winter months and seasonal meetings at other times.
8. There should be some follow-up activity planned for each class session. Adult education is of little value unless it affects the action and practices used by enrollees.

AREA VOCATIONAL SCHOOL AND AREA COMMUNITY COLLEGE PROGRAMS

Rationale and Objectives

Many studies have been made of the competencies needed by persons employed in off-farm agricultural occupations in Iowa. These studies were used as the basis for developing the curricula for many of the area school programs in agriculture. The first program was offered by the Muscatine Community College and dealt with the competencies needed by persons employed in feed and fertilizer marketing. This was the only program in Iowa in 1965-66.

Currently there are 33 area vocational school and community college programs offered in Iowa with an enrollment of 848 students. Eight of these programs are in agricultural production; three in animal science production management; seven in agricultural supplies and services; nine in agricultural power and machinery; one in floriculture; two in turf management; two in landscape, nursery and garden centers; and one in agricultural resources. Nine new programs are being started this fall. In addition to these programs there are 83 classes of veterans farm training with approximately 2,500 men enrolled.

Many of the competencies needed by workers in agribusiness and natural resources cannot be attained by students in high school. All students do not have opportunity to study agriculture in high school, and many have not completed their exploration of occupations sufficiently to be ready to participate in specialized skill development programs at that time. The area vocational schools and community colleges are major contributors in the career education process in agribusiness and natural resources.

Following is a summary of the major objectives of area vocational schools and community colleges as they relate to agribusiness and natural resource education:

1. Provide programs designed to prepare people for job entry in agribusiness and natural resource occupations.
2. Provide programs designed to provide supplemental skills of people already employed in farming and in off-farm agribusiness and natural resource occupations.
3. Provide educational programs in agribusiness and natural resources for persons with special needs.

Guidelines in Curriculum Development

The following suggestions should be helpful in developing curriculum materials for area vocational school and community college programs in agribusiness and natural resources:

1. Instructors are urged to work closely with the curriculum director and director of vocational-technical education in planning new programs and in the revision of established programs.
2. Panels of specialists and advisory groups should be used in determining both the need for and the content of new programs.
3. Planners of curricula will find it helpful to review studies made of competencies needed by persons employed in the occupation under consideration.
4. Competencies listed in previous studies should be updated by obtaining information from a sample of workers presently employed in the various job classifications.
5. The competencies listed in the nine subject-matter guides in this series (Animal Science; Agronomic Science; Agricultural Mechanics; Farm Business Management; Agricultural Supplies and Services; Agricultural Products Processing and Distribution; Horticulture; Agricultural Resources and Conservation; and Occupational Experience) may need to be modified to meet the needs of employed and more experienced workers.
6. The outlines of semester and nine-week courses may serve as guides in planning courses in postsecondary programs. Modifications will be necessary.
7. Occupational experience is assumed to be an important part of any postsecondary agribusiness and natural resource education program.
8. Community college and area vocational school personnel will need to work with local agribusiness and natural resource instructors and with cooperative extension service personnel in curriculum and program development.

SEMESTER AND NINE-WEEK COURSES

Rationale

Traditionally, vocational agriculture courses have been two-semester, or nine-month courses. In many schools students could not receive credit if only one semester of study were completed. Such programs were quite inflexible. In order for students to study certain phases of agriculture, they had to study all phases and complete the full year's work, or the four-year program.

Semester and nine-week courses are becoming common in junior high school and quite popular in senior high schools. They represent the usual organization in area vocational schools and area community colleges.

The semester and nine-week courses outlined in this guide are suggestive of courses that could be offered at secondary and postsecondary levels. They are appropriate for area vocational schools and community colleges, and as the basis for adult education programs provided by local teachers of agribusiness and natural resources.

It is the recommendation of workshop personnel that semester or nine-week courses be available to juniors and seniors in the secondary school. The practice of permitting freshmen and sophomores to enroll in courses with juniors and seniors was questioned. The nine-week and semester courses are assumed to be specialized courses and would follow, in the main, basic preparation in agribusiness and natural resource education obtained in two- or three-year core programs. It is assumed that the individual instructor will arrange his schedule so that he will teach only four or five subjects each semester in addition to assuming responsibility for young and adult farmer, FFA and occupation experience programs. Nine-week and semester courses have more potential in large, multi-teacher departments than in one-teacher departments.

Semester Courses

The following are examples of semester courses which may be offered in specific areas of agribusiness and natural resources:

Animal Science

Beef Production

- Overview of industry
- Cow-calf production
  - Selection of breeding stock
  - Feeding and management
  - Control of diseases and parasites
  - Housing and equipment
  - Marketing
  - Records
- Feeder cattle
  - Selection of feeder cattle
  - Feeding and management
  - Control of diseases and parasites
  - Housing and equipment
  - Marketing
  - Records

Dairy Production

- Overview of industry
- Breeds of dairy cattle
- Selection of breeding stock
- Raising dairy calves
- Feeding and management of producing herd
- Control of diseases and parasites
- Housing and equipment
- Marketing
- Records

Swine Production

- Opportunities in swine production
- Breeds of swine
- Selection of breeding and feeding stock
- Swine nutrition
- Housing and equipment
- Disease and parasite control
- Marketing
- Records

Poultry Production

- Overview of industry
- Egg production
  - Selection of pullets
  - Housing and equipment
  - Feeding and management
  - Control of diseases and parasites
  - Marketing
  - Records
- Turkey production
  - Selection of poults
  - Housing and equipment
  - Feeding and management
  - Control of diseases and parasites
  - Management of breeders
  - Marketing
  - Records

Agronomic Science

Cash Grain Production

- Overview of the industry
- Corn production
  - Seed selection
  - Seed bed preparation
  - Planting methods and practices
  - Fertilizing
  - Pests: weeds, insects and diseases
  - Harvesting, storing and marketing
  - Production economics
- Soybean production
  - Seed selection
  - Seed bed preparation
  - Planting methods and practice
  - Fertilizing
  - Pests: weeds, insects and diseases
  - Harvesting, storing and marketing
  - Production economics
- Oats production
  - Seed selection
  - Seed bed preparation
  - Planting methods and practices
  - Fertilizing
  - Pests: weeds, insects and diseases
  - Harvesting, storing and marketing
  - Production economics

Harvesting, Storing and Marketing Crop Products

- Introduction
- Harvesting
  - Grain
  - Forage
  - Machine operation and adjustment
  - Safety

- Storing
  - Grain
  - Forage
  - Drying and handling equipment
  - Safety
- Marketing
  - Grain
  - Forage
  - Contracting and delivery

Soil Fertility

- Introduction to soils
- Soils formation
- Physical characteristics of soils
- Classification of soils
- Chemical plant food nutrients in soils
- Soil fertility maintenance practices
- Soil conservation practices

Agricultural Mechanics

Small Gas Engine and Tractor Power

- Fundamentals of agricultural power
- Diagnosing engine problems
- Refacing valves and valve seats
- Installing piston rings, wrist pins, and bearings
- Servicing and repairing electrical systems
- Servicing and repairing fuels systems
- Lubricating power units

Drawing, Carpentry and Concrete

- Instruments and equipment for drafting
- Techniques of drafting
- Figuring bills of materials
- Selecting and caring for lumber
- Selection and using fasteners
- Cutting rafters
- Carpentry projects
- Understanding the uses and composition of concrete
- Mixing, placing, curing, and reinforcing concrete
- Concrete masonry

Welding and Metal Working

- Metalurgy
- Welding with an electric arc welder
- Welding by the oxyacetylene process
- Metal working equipment and its use
- Working hot and cold metal
- Cutting, bending, and fastening sheet metal
- Soldering

Electricity, Electric Motors, and Controls

Importance of electricity
Understanding electrical forms and measurements
Principles of wiring, switches and circuits
Selecting wire types and sizes
Electrical load protection devices
Types of electrical systems
Identification and selection of electric motors
Electric motor care
Control systems for electric motors

Farm Business Management

Money Management

- Introduction
- Determining money needs
- Credit management and savings
  - Sources of credit
  - Credit instruments
  - Farm business and personal credit needs
  - Credit costs and pay-back plans
  - Investments and savings
  - Retirement planning

Records and Record Analysis

Record systems, methods and values
Terminology
Inventories
Depreciation
Cash flow
Budgeting: business and personal
Records for tax purposes
Investment credit
Record analysis

Farm and Business Management

Introduction
Agricultural laws
Insurance
Safety
Taxes
Wills
Trusts
Corporations

Machinery Operation and Management

Introduction
Determining machinery needs
Purchasing equipment
Leasing equipment
Custom hiring farm equipment

- Machinery maintenance and operation
- Economics of housing
- Safety

Farm Appraisal and Purchase

- Orientation
- Data analyzation
- Methods of appraisal
- Methods of transfer
- Sources and methods of financing and purchasing
- Legal aspects - (zoning, deeds, abstracts, contracts)

Agricultural Supplies and Services

Business Procedures

- Making change
- Sales tickets
- Handling the money from sales
- Pricing merchandise
- Business organization and policy
- Inventory control
- Credit control
- Advertising
- Business filing systems

Salesmanship

- Selling in our American economy
- Characteristics of a salesman
- Locating and approaching consumers
- Finding the customer's need
- Presenting the product
- Handling customer's objections
- Closing the sale
- Organizing the selling effort

Agricultural Products Processing and Distribution

Grain Processing

- Overview of industry
- Purchasing and storage of grain
  - Purchasing of grain
  - Testing and grading grain
  - Operate grain elevating and transfer equipment
  - Bin and inventory grain
  - Condition grain
  - Blend grain
  - Fill orders for grain
  - Ship grain in cars or trucks
- Processing grain
  - Operate elevating and transfer equipment
  - Bin and inventory grain
  - Operate grain processing equipment

- Package and store processed product
- Maintain inventory of processed product
- Fill and invoice orders

Each of the above listed units is suggested for semester use at high school level, or the two combined as a semester unit at postsecondary level. On-the-job work experience is essential for greatest student benefit.

Egg Processing

- Overview of industry
- Processing shell eggs
  - Assembly of eggs
  - Grading, candling and pricing eggs
  - Packaging eggs
  - Storing eggs
  - Transporting eggs
  - Selling and filling orders for eggs
- Processing eggs into processed products
  - Grading and pricing
  - Storing eggs
  - Transporting raw materials
  - Operation and adjustment of processing equipment
  - Packaging processed product
  - Maintain sanitary conditions for safe and healthful processing

The processing of shell eggs could be a nine-week unit, and the processing unit as either a nine- or eighteen-week unit at the high school level. The two could be combined into an eighteen-week unit at the postsecondary level.

Meat and Meat By-Products

- Overview of industry
- Meat and meat by-products
  - Evaluation and buying of livestock
  - Slaughtering and butchering procedures
  - Evaluation of carcasses
  - Cutting of carcasses into wholesale and retail cuts
  - Identification of wholesale and retail cuts
  - Packaging of products
  - Storing product
  - Sales of products

Wool and Other Fibers

- Overview of industry
- Wool and other fibers
  - Compare natural and synthetic fibers and their uses
  - Evaluation and buying of wool
  - Storage and transportation of wool
  - Processing of wool
  - Sales of products

The above are suggested nine-week or semester courses. The instructor may wish to place more importance on certain areas, depending on whether this is secondary or post-secondary level of instruction, and the instructor's local situation.

Dairy Processing

- Overview of industry
- Processing and packaging fluid milk
  - Collecting milk from producers
  - Receive, clarify, and filter milk
  - Machinery and equipment used
  - Determine milk quality
  - Pasteurization, homogenization, and fill containers
  - Maintain sanitary equipment and facilities
- Manufacturing dairy products
  - Receive, clarify, and filter milk
  - Determine milk quality
  - Machinery and equipment used in manufacturing
  - Manufacturing the special product or by-product
  - Packaging the manufactured product
  - Storing the manufactured product
  - Maintaining sanitary equipment and facilities

The above listed units could be used as two semester courses at the high school level, or as one semester courses at the post-high school level. The student should definitely plan to work in the industry while pursuing the above suggested plan.

Vegetable and Fruit Processing

- Overview of industry
- Vegetable and fruit processing
  - Assemble and receive the raw product
  - Process the raw product
  - Storage and warehousing
  - Maintain sanitary equipment and facilities
  - Ship processed products
  - Maintain plant mechanical equipment

Most vegetable and fruit processing is very seasonal in nature. The assembling, processing, and sanitation problem areas should be taught while plant is in operation processing the product. The storage, warehousing, shipping, and plant mechanical maintenance may be completed at other times of the year.

Horticulture

Introduction to Horticulture

- Opportunities in horticulture
  - Production oriented occupations
  - Technical oriented occupations
  - Sales and service occupations
  - Information sources
- Production areas in horticulture
  - Fruit production
  - Vegetable production
  - Nursery stock production
  - Turf production
  - Flower and house plant production
  - Marketing horticultural products
  - Greenhouses and specialized structures

- Home horticulture
  - Vegetative propagation
  - Growing plants from seeds
  - Terrariums and other container gardens
  - Lawn care and maintenance
  - Perennial and annual flowers
  - Gardening
  - Greenhouses for home use
  - Planting, hardening and transplanting
  - Landscaping

Horticultural Plant Classification and Growth

- Classification of plants
  - Geographical distribution of specific plants
  - Plant structural arrangement and composition
  - Identification by common and botanical names
- Growth and development of plants
  - Reproduction of plants
  - Seed germination and viability
  - Seed germination media and requirements
- Vegetative propagation
  - Root promoting substances
  - Uses of vegetative propagation
  - Characteristics of young and mature plants
  - Effects of environmental factors
  - Life cycles of plants
- Soil and soil mixes

Landscaping

- Introduction
  - Landscaping defined
  - Importance of proper planning
  - Functional and esthetic landscapes
  - Home and industrial landscaping
- Occupational opportunities
- Basic concepts
  - Blueprint reading and drawing
  - Analysis of suggested locations
  - Estimation of landscaping costs
  - Family needs
  - Public, private and service areas
  - Landscaping structures
  - Equipment used
  - Construction techniques
  - Selecting and identifying plant materials
  - Planting and maintenance requirements
- Work experience

Lawn and Turf Management

- Introduction
  - Turf production defined
  - Turf grass selection and classification
  - Methods of establishing lawns
  - History
  - Economic importance

- Turf propagation
  - Establishing turf areas vegetatively
  - Establishing turf areas by seeding
  - Preparation for establishment
- Maintaining lawns
  - Fertilizing and maintaining soil
  - Mowing
  - Irrigation
  - Identifying and controlling pests
  - Renovating run-down lawns
- Maintaining special turf areas
  - Athletic fields, golf courses and public areas
  - Maintenance requirements

Agricultural Resources and Conservation

Natural Resources and Conservation

Agricultural resource opportunities
Air resource management
Fish management
Forest resource management
Land use planning
Outdoor recreation planning
Soil conservation
Water resource management
Wildlife management

Fish and Wildlife Management

Selection of game and non-game fish
Establishing a fish pond
Management of a stream, lake or pond
Laws and regulations concerning fish resources
Equipment used in recreational fishing
Identification of wildlife animal and bird species
Stimulating game populations
Laws and regulations of wildlife populations
Developing wildlife preserves
Hatching, feeding, raising and releasing game birds
Controlling diseases and parasites
Estimating wildlife populations
Occupational opportunities in fish and wildlife management

Soil and Water Management

Soil properties
Land measurement
Planning and zoning
Mineral resources
Identifying erosion problems
Practices for controlling erosion and sedimentation
Solid waste disposal
Livestock waste disposal
Designing and managing soil conservation structures
Utilizing soil management advisory systems

Selecting water sources
Evaluating water quality
Improving water quality
Treating wastewater
Effects of liquid wastes on streams and lakes
Occupational opportunities in soil and water management

Outdoor Recreation

Recognizing demand by public for outdoor recreation
Developing a safety program for a recreational facility
Recognizing local, state and federal laws
Financing
Advertising and promoting recreation areas
Maintaining and operating the enterprise
Practices for controlling sedimentation
Storing water
Evaluating water quality
Improving water quality
Selecting a recreational site
Laying out a campground
Planning hiking and riding trails
Planning and operating a hunting preserve
Planning sled and snowmobile areas
Occupational opportunities in outdoor recreation

Nine-Week Courses

Animal Science

Animal Nutrition

Fundamentals of nutrition
Feed nutrients
Digestive process
Feed additives
Formulating and balancing rations

Animal Breeding

Genetics
Reproductive systems
Breeding systems
Methods of breeding

Sheep Production

Overview of industry
Breeds of sheep
Selection of breeding stock
Feeding and management
Housing and equipment
Disease and parasite control
Marketing
Records

Horse Production

- Horse selection
- Caring for brood mare and foal
- Basic horsemanship
- Control of diseases and parasites
- Housing and equipment

Agronomic Science

Crop Production

- Introduction
- Plant growth
- Plant identification
- Germination and emergence
- Photosynthesis and respiration
- Propagation and improvement
- Corn
- Soybeans
- Oats and other small grains
- Forages

Pests of Agricultural Crops

- Overview of pest problems
- Weeds
  - Identification
  - Growth patterns
  - Control
- Insects
  - Identification
  - Life cycle
  - Control
- Diseases
  - Identification
  - Life cycle
  - Control

Agricultural Mechanics

Small Gasoline Engines

- Principles of operation
- Disassembly and reassembly
- Compression
- Ignition
- Carburetion
- Trouble/shooting
- Preventive maintenance

Concrete

- Opportunities in concrete construction
- Selecting ingredients for concrete mixes

Concrete mixes
Placing and reinforcing concrete
Finishing and curing concrete
Special concrete applications

Farmstead Planning and Farm Structures

Location of the farm site
Space requirements for crops and feeds
Space requirements for livestock
Arrangement of the farmstead
Types of farm buildings
Planning the windbreak
Planning the fences
Planning the electrical distribution system
Planning the water system
Ventilation of farm structures

Farm Storage and Materials Handling

Storage capacity of structures
Grain storage
Forage storage
Machinery storage
Feed storage and distribution systems
Animal waste handling systems

Farm Crops and Feed Handling Systems

- Structures for crops and feeds
- Grain drying systems and equipment
  - Feed wagons
  - Conveyors
  - Elevators
  - Augers
- Feed grinders and mixers
- Planning a flow of grain and feeds to livestock

Agricultural Supplies and Services

Human Relations

Importance of human relations
Know yourself
Developing self-confidence
Setting clear goals
Job relations with superiors and fellow workers
Influencing people
Etiquette

Horticulture

Growing Vegetables

- Growing factors
  - Soil and composting

  - Water and fertilizer
  - Climate
- Gardening techniques
  - Planning the garden
  - Seeds and transplanting
  - Growing vegetables without a garden
  - Greenhouse gardening
- Problem areas
  - Insects and diseases
  - Troubleshooting
- Individual vegetables

Greenhouses

- Structural concepts
  - Types of greenhouses
  - Purpose of greenhouse structures
  - Construction materials and equipment
  - Location of greenhouses
- Cultural practices
  - Selecting growing mediums
  - Sterilizing soil and equipment
  - Environmental control
  - Propagating greenhouse plants
  - Potted plant production
  - Cut flower production
  - Use of greenhouse equipment
  - Controlling greenhouse insects and diseases
- Greenhouses for home use

Floral Design

- Handling cut flowers and foliage materials
- Basic design concepts
  - Uses of floral arrangements
  - Characteristics of flowers, plant and decorative material
  - Identifying floral design materials
  - Factors of design
  - Techniques and materials of construction
- Construction of floral arrangement

Agricultural Resources and Conservation

Wildlife

- Identifying bird and game species
- Selection and identification of fish
- Developing wildlife habitat
- Hatching game birds
- Releasing game birds
- Managing a stream, lake or pond
- Laws and regulations of fish and wildlife
- Equipment use and safety
- Occupational opportunities in wildlife resources

Outdoor Recreation

Recognizing demand by public for recreation activities
Safety in using recreational facilities
Recognizing local, state and federal laws
Laying out a campground
Advertising and promoting recreation areas
Evaluating water quality
Planning hiking and riding trails
Selecting a recreational site
Providing recreational facilities
Occupational opportunities in outdoor recreation

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Agribusiness and Natural
Resource Education

Curriculum Guide

ANIMAL SCIENCE

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Grimes State Office Building
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1973

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SOURCE OF CURRICULUM GUIDES

The following ten curriculum guides in agribusiness and natural resources are available as a set from the Department of Public Instruction:

Agribusiness and Natural Resource Education

Animal Science

Agronomic Science

Agricultural Mechanics

Farm Business Management

Agricultural Supplies and Services

Agricultural Products Processing and Distribution

Horticulture

Agricultural Resources and Conservation

Occupational Experience in Agriculture

Order from Information and Publications Services Section, Department of Public Instruction, Grimes State Office Building, Des Moines, Iowa 50319.

Price, $5.00 per set of ten curriculum guides listed above. Please send remittance with order.

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FOREWORD

This curriculum guide is one of ten developed for use by vocational and technical agribusiness instructors in planning instructional programs to meet the needs of their students. Elementary teachers and instructors in other subject matter areas at the secondary level may find the guide of value in introducing principles of career education in their instructional programs. Although much of the material is designed for use at the secondary or post-secondary levels, many of the competencies may be introduced at the awareness or exploratory levels of career education.

Instructors in multiple-man departments at the secondary level and in post-secondary schools may organize nine-week or semester courses around the units and problem areas outlined in this guide.

Appropriate competencies and learning activities have been provided for each problem area. The competencies listed are those determined in previous studies as needed by persons employed in livestock production and marketing. Instructional aids and references are listed for each unit.

A list of titles of occupations requiring competencies in animal science has been included in the guide. It is assumed that only partial attainment of some competencies can be done at the secondary level. The competencies may not be mastered until the student has completed additional preparation at the post-secondary, young or adult class, or collegiate levels. It is assumed that "hands-on" and occupational experience will be provided with class and laboratory instruction at all levels.

Evaluation of the instruction in animal science should be based largely upon attainment of the competencies listed in this guide, and on the application of them as students participate in occupational experience programs.

Allocations of units and of instructional time in the four-year sequence of courses at the secondary level are presented in the curriculum guide titled Agribusiness and Natural Resource Education. Also presented are suggested activities involving animal science for teachers at the kindergarten through sixth grade level, and suggested outlines of subject matter to be included in exploratory programs at the junior high school level.

Curriculum Guide, Animal Science was prepared by Frederick VanLoh, Vocational Agriculture Instructor, Sheldon, Iowa (Committee Chairman); Daniel Brown, Graduate Student, ISU; and by Lyle R. Johnson, Veterans Instructor, Litchfield, Minnesota.

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OCCUPATIONAL TITLES

Instructional programs based upon content in this guide will prepare individuals for job entry, will upgrade occupational skills, or will prepare learners for further occupational preparation.

General Occupations

Farmer
Veterinarian (large animal)
Farmhand
Livestock Herdsman
Livestock Auctioneer
Livestock Breeder
Production Researcher
Nutrition Researcher
Meat Science Researcher
Nutritional Physiologist
Livestock Farmer
Veterinarian's Assistant
Livestock Farmhand
Animal Science Teacher
Livestock Caretaker
Extension Service Livestock Specialist
Breeding Researcher
Muscle Biology Researcher
Livestock Geneticist
Reproduction Researcher
Artificial Insemination Technician

Beef Occupations

Beef Farmer
Beef Herdsman
Beef Teacher
Beef Breeder
Stock Ranch Foreman
Cattle Feeder
Beef Farmhand
Cowboy
Feedlot Foreman
Feedlot Maintenanceman
Cattle Rancher

Dairy Occupations

Dairy Teacher
Dairy Farmhand
Dairy Breeder
Dairy Farmer
Dairy Herdsman
Milking Machine Operator

Horse Occupations

Horse Herdsman
Horse Farmhand
Horse Trainer
Barn Boss
Farrier
Horse Breeder
Horse Stableboy
Horse Teacher

Poultry Occupations

Egg Poultryman
Poultry Debeaker
Poultry Teacher
Turkey Breeder
Poultry Farmhand
Poultry Breeding Researcher
Poultry Products Technologist
Meat Poultryman
Chicken Sexer
Chicken Breeder
Poultry Farmer
Poultry Geneticist
Poultry Nutrition Researcher

Sheep Occupations

Sheep Farmer
Sheep Farmhand
Wool Shearer
Sheep Herdsman
Sheep Teacher
Sheep Breeder

Swine Occupations

Swine Breeder
Swine Herdsman
Swine Teacher
Swine Farmer
Swine Farmhand

ANIMAL SCIENCE

GENERAL OBJECTIVES

Students completing instruction in animal science will have strengthened their interests in the livestock industry and have developed abilities to:

1. Analyze their future employment opportunities in the industry.
2. Analyze the contribution of livestock to the economy of the local community, state and nation.
3. Plan and manage profitable livestock production enterprises.

UNITS

Livestock Industry
Animal Nutrition
Animal Breeding
Beef Cattle
Dairy Cattle
Horses
Poultry
Sheep
Swine

Livestock Industry

Problem Areas

A. The importance of livestock to the economy
B. Occupational opportunities

Competencies and Learning Activities

A. The importance of livestock to the economy

Competencies - students will be able to:

1. Explain the importance of the livestock industry in local community, state and nation.
2. Determine the contribution of the livestock industry to the diet of humans.
3. Recognize trends in livestock production for local area, state and nation.
4. Estimate the value of all livestock produced on home farm, state and nation.
5. Recognize factors affecting the location of major livestock enterprises in the state and nation.
6. Select livestock enterprises for home farm.
7. Compare Iowa with the nation in regard to amount of livestock produced.

Learning activities:

1. Give oral reports on livestock enterprises conducted on home farms.
2. Use worksheets to prepare budgets for various livestock operations.
3. Prepare a map of the state and locate the major livestock enterprises by area.
4. Conduct a survey of farms within a 20 mile radius indicating the kinds and size of the various livestock produced.

5. Select three livestock enterprises and prepare a line graph for each showing trends in livestock population for the past ten years.
6. Use Iowa census to determine the ten top counties in swine and beef production.
7. Write a 500 word essay entitled, "The Importance of Meat and Milk in the Human Diet."
8. Interview a minimum of ten housewives and determine the percentage of the food budget which is used for purchasing meat, poultry and dairy products. Present a visual display of your results.

B. Occupational opportunities

Competencies - students will be able to:

1. Recognize the value of a farm background in addition to the skills acquired from the individual farming or work experience program.
2. Identify employment opportunities which require knowledge related to animal science.
3. Recognize occupational opportunities in the livestock industry which require additional training.
4. Plan future educational training which would be required for a chosen occupation in the livestock industry.
5. Realize the advantages and disadvantages of two possible employment opportunities regarding your area of interest in the livestock industry.

Learning activities:

1. Prepare a bulletin board display indicating various occupational opportunities in animal science.
2. Committees present information revealing training and education required, hours worked, physical requirements, equipment needed, travel involved and salary expected for a given list of occupations.
3. Conduct a survey to determine existing or potential employment opportunities related to animal science.
4. Interview resource people in community and present information to entire class.

Instructional Aids

1. Armour Food Source Map - Chicago, Illinois.
2. Meat Publication and Visual Aid Catalog - National Livestock and Meat Board.
3. Films - The Dynamics of Animal Agriculture - ISU.
   Food for a Modern World - ISU.
   Dynamic Careers Through Agriculture - ISU.
   Your Careers in Agriculture - Texaco, Inc.
4. Filmstrip - Careers in Animal Industry - California Polytechnic University - San Luis Obispo
5. Source Units for Animal Science - Michigan State University, East Lansing, Michigan.
6. Charts of Agricultural Occupations for Farm Youth - Interstate.
7. Career Opportunities in the Meat-Packing Industry - 59 E. Van Buren Street, Chicago, Illinois: American Meat Institute.
8. D.O.T. - Dictionary of Occupational Titles.

Animal Nutrition

Problem Areas

- A. Basic fundamentals of animal nutrition
- B. Feed nutrients
- C. Digestion
- D. Feed additives
- E. Formulating and balancing rations

Competencies and Learning Activities

A. Basic fundamentals of animal nutrition

Competencies - students will be able to:

1. Explain importance of a balanced ration.
2. Tell why feeds vary in nutritive value and palatability.
3. Explain the differences between crude and digestible protein.
4. Explain how the environment affects nutrient requirements.
5. Examine fecal droppings of livestock and explain how the consistency of the feces is a guide in determining proper nutrient intake.
6. Explain how fat, lean and bone develop in relation to age, sex and weight.
7. Explain how "bloom" is associated with animal nutrition.
8. Select proper size screen for feed grinder to obtain desired fineness in preparation of feed.
9. Explain how feed preparation affects performance of livestock.
10. Describe the advantages and disadvantages of roller vs. hammer mill in processing feed.
11. Explain the advantages of using high moisture grain.
12. Explain how feed efficiency is affected by the roughage-concentrate ratio.

Learning activities:

1. Each student will write a theme on animal nutrition using 15 of 20 terms from a prepared list.
2. Students prepare a display of feed prepared by various methods (examples could include pelleted feed, fine and coarse ground, flaked grain, dry corn and high moisture corn, ensiled grain or hay).
3. Students bring in samples of grain and hay from home and rank samples for quality.
4. Group students with similar farming programs and have them determine the feed cost in producing livestock using their supervised farming records.
5. Each student will compare feeding efficiency as related to seasonal variation using data from swine test stations.
6. Students conduct a panel discussion regarding feed preparation on the home farm.
7. Students plan a field trip to observe various methods of feed processing.

B. Feed nutrients

Competencies - students will be able to:

1. Explain the function of the following feed nutrients: carbohydrates, fats, proteins, minerals, vitamins and water.

2. Categorize feedstuffs as to roughages, concentrates or supplements.
3. Classify protein sources as animal or vegetable.
4. Given prices of three protein sources determine which would be the most economical.
5. Analyze a feed tag and tell how this information is of value to a livestock producer.
6. Collect a representative sample of grain and roughage used on the home farm and have it tested for protein content.
7. Prepare a simple mineral mix for use on home farm.
8. Identify factors which cause variation of water intake and explain how animal performance is affected.
9. Collect a water sample from source used by livestock on home farm and have it tested for hardness, nitrate and bacteria.
10. Explain how quality of water affects animal performance.
11. Describe the effects of fluorine, selenium, and molybdenum as pertaining to animal performance.
12. Explain the importance of salt in animal feeding and give advantages and disadvantages of loose versus block salt.
13. Identify feed sources supplying vitamin A and explain the importance as it relates to resistance to infection.
14. Explain the relationship of carotene and vitamin A.

Learning activities:

1. Each member of class compare the results of the water sample collected for analysis.
2. Use video tape, super 8 or colored slides in demonstrating the proper procedure for collecting water samples (students set up and conduct demonstration).
3. Each student collect articles and pictures which relate to nutrient deficiency in livestock. (Post on bulletin board or use for oral reports).
4. Each student bring in feed tags and analyze the information.
5. Divide class in committees and assign one of the six feed nutrients to each with a worksheet to complete including the function, source and deficiency symptoms for the given nutrient.
6. Have students make a simple mineral mixture (could use portable cement mixer in the shop).
7. Students organize the collection of samples of ingredients used in preparing concentrate mixes (small glass jars are recommended).
8. Each student prepare a written paper on the importance of the calcium-phosphorous ratio for the various classes of livestock.
9. Students arrange for resource person to explain the methods of improving water supply high in bacteria.
10. Students arrange a field trip to a farm where a chlorinator has been or is being installed.

C. Digestion

Competencies - students will be able to:

1. Identify the parts of the digestive tract of cattle, swine, sheep, chicken and explain the function of each part.
2. Describe the physical versus the chemical action in the digestion process.

3. Compare the digestive process of swine, poultry, ruminants and horses.
4. Summarize the digestive process from the time food enters the mouth until the unabsorbed residue is excreted.
5. Explain "osmosis" as it relates to the digestive process.
6. Examine fecal droppings of various classes of livestock and explain differences in feed conversion in poultry versus hogs versus cattle.

Learning activities:

1. Each student label parts of the digestive tract of a cow, pig, horse and chicken (use worksheets with overhead transparency).
2. All students construct a chart which summarizes the digestive process including the various organs, digestive juices, enzymes and action taking place in each organ.
3. Students arrange a field trip to locker plant or processing plant and identify parts of the digestive tract.
4. Each student remove the digestive tract from a chicken and examine each part of the digestive organs. (Home economics instructor may be helpful).
5. Students prepare a demonstration illustrating osmosis (equipment should be available from science department).
6. Write report entitled "Why doesn't a pig chew a cud?" (Students could write a comparison on the monogastric and ruminant digestive system).
7. Students collect samples of materials that are used in ruminant nutrition for replacing roughages. Discuss the advantages and disadvantages of the use of these materials.
8. Have students debate the value of all-concentrate diets for beef cattle.

D. Feed additives

Competencies - students will be able to:

1. Identify and explain the use of the four most important kinds of feed additives.
2. Analyze the value of single antibiotic additives versus mixtures.
3. Explain the differences in the chemical structures of the major antibiotic feed additives.
4. Summarize and explain the importance of the withdrawal dates on a given list of additives.
5. Explain the use of arsenical additives in rations.
6. Explain the use of Mecadox as a feed additive.
7. Explain how synthetic growth hormones work to increase animal gains.
8. Explain and justify the use of tranquilizers.
9. Choose two additives and show how each differs as to therapeutic and preventative maintenance levels.
10. Plan a feed additive program for specific enterprises.

Learning activities:

1. Field trip observation of a local feed mill's use of additives.
2. Formulate a list of additives which will increase the animal's growth rate, including the level recommended and withdrawal dates.
3. Formulate a list of additives which will treat scours including recommended levels and withdrawal dates.

F. Formulating and balancing rations

Competencies - students will be able to:

1. Summarize and explain the essential ingredients needed in a balanced ration for swine, beef, sheep, horses, poultry, and dairy cattle.
2. Explain the various methods of preparing feedstuffs for livestock rations.
3. Compare the average daily feed requirements of the classes of farm animals.
4. Explain the supplemental feeds needed in the feeding of the livestock fed on the home farm or on an example farm.
5. Use the appropriate table to calculate the feed requirements for various stages of growth and performance of selected livestock.
6. Summarize and explain the reasons for different nutrient requirements in a given class of farm animals.
7. Describe the economics for feed substitutes in terms of total digestible nutrients.
8. Explain and use two methods of balancing rations.
9. Discuss the value of recycled animal wastes for feed.
10. Describe the benefits of various feeding methods for swine, sheep, and beef feeder cattle (pasture, confinement).
11. Calculate the cost of average daily gain at different rates of gain for various animals.

Learning activities:

1. Describe the essential ingredients needed in a balanced ration for two livestock classes found on the home farm and explain why differences exist.
2. Prepare a display of one feedstuff prepared in various ways.
3. Have the class assemble the feed needed to feed a 500 pound calf to 1000 pounds (include energy sources, roughage, protein sources).
4. Calculate a sample ration using two different methods.
5. Telephone the feed mills in the community and compare the costs of similar protein supplements from the various sources.
6. Make a diagram explaining the different feed rations for one animal at various stages in its life.
7. Calculate the feed cost differences between two groups of livestock with different average daily gains.
8. Write a paper on the topic "Recycled Animal Wastes as Energy Sources in Livestock Rations".
9. From farm record book data, calculate the cost of the ration for your livestock enterprise or an example livestock enterprise for one month.
10. Calculate the differences in expense of a ration by substituting different protein and energy sources.
11. Develop proficiency in the use of nutrient requirement tables.
12. Divide the class into six groups and have each group assemble the feed which each class of livestock would consume daily.

Instructional aids

1. Digestion in animals; Illinois Vocational Agriculture Service 1026.
2. Oklahoma Vocational Agriculture Education, Basic Core Curriculum I., Oklahoma State University.

3. Source Units for Animal Science - Michigan State University, East Lansing, Michigan.
4. Swine Digestion - Slidefilm - Illinois (VAS) Illinois Vocational Agriculture Service.
5. Livestock Production - Specialized Study - 11th and 12th grades, Agriculture Education Service - Montgomery, Alabama.
6. Nutrition Series in Animal Science (Lesson 1-6) ISU.
7. General Facts on Livestock Feeding - Illinois VAS 1013.
8. "The Rumen Story" - film. Purina Company.
9. Feed Additives - Illinois VAS 1038.
10. Materials collected by students as listed in learning activities.
11. Local resource people (home economics instructor, veterinarian, feed salesmen, livestock feeders).
12. Farm Feed Processing - Gehl Brothers.
13. Good Feed Mixing Practices - AS - 349 Iowa Extension Service.

Animal Breeding

Problem Areas

A. Genetics
B. Reproduction system
C. Breeding systems
D. Methods of breeding

Competencies and Learning Activities

A. Genetics

Competencies - students will be able to:

1. Define and explain the use of genetics in the improvement of animals through breeding.
2. Explain mitosis with use of illustrations.
3. Explain causes for variation in volume of semen, numbers of sperm produced and why some animals are more prolific than others.
4. Compare the maturation process of the male and female germ cells.
5. Explain why some twins are identical and others fraternal.
6. Use symbols to differentiate homozygous and heterozygous genes and explain the difference.
7. Recognize dominant and recessive traits in poultry, cattle, sheep, swine and horses.
8. Observe the offspring of horned cattle mated with a polled bull and determine if the bull is homozygous for the polled character.
9. Diagram the expected ratio of crossing two pairs of heterozygous characters.
10. Explain how environmental factors cause variations in livestock.
11. Explain the sex-linkage theory.
12. Explain the difference in male and female sex chromosomes in livestock as compared to poultry.

Learning activities:

1. Use work sheets and all students identify and label parts of animal cell.
2. With the aid of transparency or filmstrip have several students prepare and present a class discussion on mitosis and meiosis.
3. All students prepare diagrams illustrating probable results from mating dominant and recessive characters, color determina-

tion in Shorthorns and sex determination in animals.

4. Committees be assigned to report on selected topics for improving animals through breeding.
5. Write a paper on how competencies in genetics can be used to improve livestock on home farm.
6. Field trip planned by students to observe animals and students indicate characteristics of individual animals which they think are due to genes and those due to environment.

B. Reproductive systems

Competencies - students will be able to:

1. Discuss animal reproduction using the vocabulary associated with the topic.
2. Identify and describe anatomy and physiology of the male reproductive system.
3. Identify and describe anatomy and physiology of the female reproductive system.
4. Discuss the endocrine glands, the hormones, and their functions in reproduction.
5. Explain the common defects of the reproductive systems of the male and female which cause reproductive failure.
6. Describe the process of fertilization to include ovulation.
7. Outline the growth of the fetus during gestation.
8. Explain the process of parturition and lactation including the physiological areas and the hormones involved.
9. Summarize and explain the variation in the estrus cycle, length of gestation, and the amount of semen and sperm produced for each livestock class.

Learning activities:

1. Give oral reports dealing with the anatomy and physiology of the male and female reproductive systems.
2. Label diagrams of the reproductive systems of the male and female for two classes of farm animals.
3. Outline the hormones, their sources, and their functions for both the male and female.
4. For the six classes of livestock, compare the length of the estrus cycle and the length of gestation for the female, and the quantity of semen and of sperm of the male.
5. Have a class panel discuss the topic "Five Common Reproductive Defects Found in Livestock."
6. Diagram the process of reproduction to include formation of sperm and egg, fertilization, growth of the fetus during gestation, and parturition for one class of livestock which exists on the home farm.

C. Breeding systems

Competencies - students will be able to:

1. Identify five breeding systems and explain each.
2. Describe the advantages and disadvantages of crossbreeding.
3. Identify and explain the importance of factors to consider when selecting a breeding system.
4. Explain the use of linebreeding in improving animal breeding.
5. Explain hybrid vigor as it relates to the crossbreeding system.

6. Recognize the disadvantages of inbreeding.
7. Determine the percentage of inbreeding, given various matings.
8. Justify the maintaining of purebred herds and breeding systems.

Learning activities:

1. Compare purebred and crossbred performance using university research, and list the advantages of each system.
2. List the advantages and disadvantages of inbreeding, using available research.
3. Calculate the mating which would produce the following percentages of inbreeding: 25%, 12.5%, 6.25%, 3.125%.
4. Interview a local purebred breeder as to what system(s) he uses and why.
5. Formulate a straight breeding program for a selected animal enterprise, showing the method to be used and how it would be developed.
6. Identify and explain the breeding systems used on the home farm.

D. Methods of breeding

Competencies - students will be able to:

1. Describe the differences in breeding seasons for livestock.
2. Discuss the age of sexual maturity for swine, sheep, horses, poultry, dairy, and beef cattle.
3. Discuss and summarize the various methods of natural breeding used on farms in the community and state.
4. Evaluate artificial insemination for beef, swine, dairy, horses, and poultry.
5. Describe the methods of collecting and storing sperm for various classes of livestock.
6. Explain how swine and cattle are artificially inseminated.
7. Discuss the role of hormones in cycle synchronization and in producing multiple births.
8. Describe the effect of embryo transplanting in the future of animal breeding.
9. Determine the time of estrus for properly inseminating livestock.
10. Explain the collection, dilution, and insemination of one class of animal found on the home farm.

Learning activities:

1. Write a theme on the seasonal variations of breeding livestock on the home farm (describe the advantages and disadvantages).
2. Prepare a chart of the natural breeding methods used in the community and the state.
3. Divide the class and debate the topic "The Benefits of Artificial Insemination for the Home Farm."
4. Formulate a table on the differences in ages of sexual maturity for farm livestock.
5. Outline the procedure of collecting semen, diluting sperm, storing sperm, and inseminating females for two classes of livestock (include all steps).
6. Lead a class discussion on the future of embryo transplanting in livestock.
7. Interview area artificial inseminating salesmen on techniques of inseminating cattle (use cassette tape and record for class).
8. Detect estrus in swine, cattle, and horses for the artificial insemination of the female.

9. Collect semen from the male and keep the sperm viable.
10. Dilute sperm with various extenders.
11. Properly cool and store sperm for future inseminating work.
12. Inseminate a female animal with hot semen and artificially extended sperm.

Instructional Aids

1. Improving Animals Through Breeding - Illinois (VAS) Vocational Agriculture Service 1009.
2. Instructional Materials for Vocational Agriculture III, Texas A & M University.
3. Heredity - film NS 692 ISU.
4. Genetics - transparency masters (169-7) Vocational Education Production - California Polytechnic State University.
5. Embryo Development of Chick - filmstrip - same source as item 4.
6. Pre-Natal Development of the Calf - filmstrip - same source as item 4.
7. Livestock Breeding - transparencies - Department of Agriculture Education - Ohio State University.
8. Artificial Inseminator as resource person.
9. Artificial Insemination - transparencies (171-7). Vocational Education Productions - California Polytechnic State University.
10. Advanced Livestock Production - University of Missouri.
11. Advanced Livestock Production - Vocational Resources Center - Indiana State University.
12. Pork Quality as Influenced by Genetics - 69-1-D Pork Producers Council.

Beef Cattle

Problem Areas

A. Selection of breeding stock
B. Feeding and managing the breeding herd
C. Feeding and managing calves
D. Selection of feeder cattle
E. Feeding and managing feeder cattle
F. Control of diseases and parasites
G. Housing and equipment for beef cattle
H. Record keeping and analysis
I. Marketing beef cattle

Competencies and Learning Activities

A. Selection of breeding stock

Competencies - students will be able to:

1. Compile a list and explain the various breeds of beef cattle, their origin, association and breed characteristics for both the established and the exotic breeds.
2. Describe the criteria used in selecting heifers and bulls for the breeding herd.
3. Analyze a pedigree and evaluate its use in the selection of replacement breeding stock.
4. Identify and explain the relationships (importance) of the parts of the beef animal.
5. Using the proper vocabulary, evaluate a class of potential breeding animals for the characteristics desired in breeding stock.

6. Describe the three steps in the livestock selection process.
7. Determine the breeding stock available in your community.
8. Create and support your plan of a breeding system for beef cattle for your operation or for an example operation.
9. Describe the trends and goals in beef cattle breeding.
10. Estimate the capital needed in obtaining foundation breeding stock for the breed of your choice.
11. Evaluate and summarize the national beef cattle breeding program.
12. Describe the skills needed in artificially breeding beef cattle.
13. Explain the use of production records in beef animal selection.
14. Summarize the benefits of major accomplishments in animal breeding, and include the names associated with each accomplishment.
15. Compare a purebred with a commercial beef breeding operation.
16. Describe the importance of testing associations in the improvement of breeding cattle.

Learning activities:

1. Cull poorer animals through the evaluation of production records.
2. Select heifers and bulls (live animals or pictures) for breeding stock, summarizing why you chose the animals.
3. Collect and display pictures of the various beef breeds found on the home farm or on example farms.
4. Describe a method of determining breeding efficiency.
5. Calculate the adjusted weight of a bull for 205, 365, and 550 days.
6. On a field trip, analyze local farms in the community to observe the various beef breeds and their characteristics.
7. Create a crossbreeding system for your beef enterprise or an example beef enterprise and explain the characteristics you plan to develop from your system.
8. Survey your community to determine the availability of desirable breeding stock and summarize your findings.
9. Compile a guide of bull and semen sources for the beef breed of your choice.
10. Describe and summarize the role of heredity and genetics in the selection of replacement breeding animals.
11. Contact area cattlemen who are members of beef production associations and summarize their livestock record-keeping systems.
12. Explain the purpose of production testing and describe how it would be beneficial in selection.
13. Define how visual appraisal or judging is useful in a beef improvement program.
14. Describe the use of ultrasonics in beef selection.
15. FFA set up a judging contest and have each student judge a class of beef breeding animals and present oral reasons for their placement.
16. Interpret the pedigree of two beef animals, determine which you would desire in your breeding program for the home farm and support your answer.
17. Describe orally the role of Bull Testing Stations in the evaluation of quality stock for breeding purposes.
18. Develop proficiency in the use of the Instant Beef Performance Calculator.

19. Present group reports on innovations in animal breeding both past and present.
20. Demonstrate and/or orally describe the techniques of fitting and showing a beef animal.

B. Feeding and managing the breeding herd

Competencies - the students will be able to:

1. Calculate the length of time per year that a pasture may be utilized on your home farm.
2. List the crop byproducts in your community which might be used as roughages for beef cattle.
3. Compute a balanced ration for a beef cow during a winter month, and during a summer month.
4. Describe a breeding system desirable for your home farm including age of breeding, number of females per male, and season of breeding/calving.
5. Explain how you would assist a cow with calving difficulties.
6. Discuss the danger of feeding molded hay to breeding stock.
7. Estimate the amount of feed needed to winter a beef cow in your area.
8. Approximate the acres of pasture needed to carry a cow and calf for one year in your community.
9. Explain why you would or would not keep your herd sire with your cow herd the year around.
10. Discuss the advantages and disadvantages of the various types of legumes and grasses for pasture on your home farm.
11. Summarize the most important factors influencing profitability for the cow-calf herd.
12. Identify the benefits of the various methods of individual livestock identification.

Learning activities:

1. Identify in writing the problems associated with breeding cattle which are too small or too young.
2. Use class panels to discuss the role of testing in analyzing cow and calf herds.
3. Identify and summarize four signs of parturition in beef cattle.
4. Have a local veterinarian visit class to discuss calving problems.
5. Have each class member compute the pasture usage time for their home farm and compare the differences in days.
6. Prepare a display of the samples of crop byproducts in your community used as roughages.
7. Formulate and balance a ration for a breeding cow for both the summer and winter.
8. Bring in hay samples from your home farm and discuss the dangers of mold.
9. Calculate the acres of pasture needed to maintain a cow/calf unit on your home farm or community.
10. Conduct an experiment of various legumes and grasses utilized on pastures in your area.
11. Diagram a breeding program for the home farm or an example farm.
12. Have students summarize the most important factors influencing the profitability of cow-calf operations.

13. Select one method of livestock identification and demonstrate that method.

C. Feeding and managing calves

Competencies - the student will be able to:

1. Explain the approved practices dealing with newborn calves.
2. Compute a creep feed ration using feedstuffs on the home farm.
3. Explain how you would prevent calf scours.
4. Identify and explain management practices for young calves and indicate the procedure and age for each practice (include individual identification, castration, dehorning, and weaning).
5. Explain why newborn calves cannot utilize roughages.
6. Describe and summarize preconditioning of calves for feeder animals.
7. Identify common problems with young calves - see Disease section in this problem area.

Learning activities:

1. Discuss orally why you agree or disagree with the practices of navel disinfecting, dehorning, and horn training.
2. Fill out accurately the registration records to admit an animal to its breed registry.
3. Describe and summarize the importance of colostrum in the first day of life.
4. Orally describe four methods of dehorning cattle and give the benefits of each method.
5. Have class discussion relating what each student feels to be the five most important practices during and after calving.
6. Identify the methods of castrating calves and orally describe them or demonstrate each method.
7. Describe the method used in the identification of individual animals on your home farm presenting reasons why you prefer one method over the others.
8. Demonstrate one technique of calf dehorning.
9. Debate the advantages and disadvantages of preconditioning calves for feeding purposes.
10. Compute a creep feed ration for calves.
11. Have each student write down the age they would wean calves as producers and discuss the ages they selected.

D. Selection of feeder cattle

Competencies - the student will be able to:

1. Identify the expensive wholesale cuts of beef and explain where each is located on the carcass and live animal.
2. Define the most important qualities to consider in selecting feeder cattle.
3. Describe how being proficient in judging livestock would aid the producer in his selection of feeder cattle.
4. Explain the advantages and disadvantages of a feeding program using crossbred animals.
5. Evaluate the physical characteristics of a feeder steer from the home farm.
6. Describe the classification and grading of beef feeder cattle.
7. Identify and define the important factors to consider in estimating the grade and yield of feeder cattle.

8. Define and summarize the common faults in the conformation of feeder cattle.
9. Create a list of sources of feeder cattle for your home farm.

Learning activities:

1. Place a class of feeder cattle based upon their physical characteristics and present oral reasons for that placement using the correct vocabulary.
2. Estimate the grade and yield of a feeder animal and identify the criteria on which you based your decision.
3. Conduct a debate on the benefits of using crossbred animals in a cattle feeding enterprise.
4. Describe the deficiencies in conformation found in feeder cattle.
5. Write a paper stating your viewpoint on the role of evaluating in feeder cattle selection for your operation.
6. Visit a stockyard on a field trip to view the sale of feeder animals and explain why you would or would not have purchased one selected group of cattle.
7. Use casette tape recorders to interview cattle feeders in the home community about their views of the most important quality to consider in the selection of feeder cattle.
8. Develop a display depicting sources of feeder cattle for your home farm and include the means of transporting them.

E. Feeding and managing feeder cattle

Competencies - the student will be able to:

1. Formulate a balanced ration around home grown feeds for feeder cattle on full feed.
2. Explain the necessity of having loose salt and a mineral mixture available to cattle.
3. Design the incremental steps in getting range or pasture calves to full feed indicating the length of time for each step.
4. Explain the role of urea as a protein supplement in cattle feeding.
5. Determine the time and feed (amount and cost) it would take for an animal fed from 500 pounds to 1,100 pounds.
6. Define compensatory growth and explain how it affects feeder cattle.
7. Summarize the various means of obtaining a profit in cattle feeding.
8. Describe the implementation of a confinement feeding cattle operation on the home farm.
9. Compute the nutrient value of silage in the ration and summarize its use in the animal.
10. Identify and price grains and grain substitutes and protein and protein substitutes for feeder cattle.
11. Describe the various feeding methods and determine which best fits into your total farming program.
12. Explain the advantages and disadvantages of home ration mixing versus the purchase of a total ration.
13. Indicate the benefits of antibiotics in cattle feeding and summarize the regulations affecting the feeding of each drug.
14. Summarize the procedure of implanting antibiotics.

15. Describe the benefits of a pre-conditioning program for feeder cattle.
16. Explain the effect of differences in feeder animals according to sex, grade, age, and conformation.
17. Describe the management practices of handling new feeder cattle the first 48 hours.

Learning activities:

1. Conduct a class debate upon the risk and profit potential of a cattle feeding operation.
2. Prepare a chart of the grades of feeder cattle in terms of sex, age, weight, and conformation.
3. Compute the break-even point in purchasing feeder cattle and selling the finished animal.
4. Using feedstuffs available on the home farm, compute a ration for an animal on full feed including water and minerals.
5. As a class, describe the incremental steps involved in getting a calf onto a full-feed ration.
6. Have a feed salesman speak on the role of urea as a protein supplement in the feeding of cattle.
7. Demonstrate, or orally describe, the process of implanting, giving its purpose.
8. Calculate the total feed needed (tons and cost) in a ration for a feeder animal for its entire stay on your farm from purchase to market.
9. Identify and price from four sources in your community, grain and grain substitutes and proteins and protein substitutes for feeder cattle on your home farm.
10. Have an area meat inspector as a resource person discuss the regulations affecting the use of drugs and additives in animal feeds.
11. Conduct interviews of cattle feeders in the area and summarize their views about the pre-conditioning of feeder cattle.
12. Divide class and debate the advantages of home mixed rations versus purchasing a total ration.
13. Identify the various feeding methods for feeder cattle and choose the benefits of each method as it relates to your home farm.
14. Students prepare a summary of the management practices of handling new feeder cattle during the first 48 hours.

F. Maintaining the health of beef animals

Competencies - the student will be able to:

1. Explain the importance of isolating purchased animals from the existing herd as it pertains to disease control.
2. Identify and describe diseases prevalent in your area which may be controlled by vaccination.
3. Evaluate the home farm facilities in terms of sanitation, dryness, and ventilation.
4. Describe the use of chemicals in disinfecting facilities.
5. Discuss the importance of testing herd for Bangs disease and the practice of calfhood vaccination.
6. Diagnose illness in beef animals and either determine the disease or parasite or contact your veterinarian.

7. Explain the importance of a worming program, including the chemical used and the worms affected.
8. Establish a program of disease and parasite prevention for your home farm.
9. Describe the economic losses of diseases in beef cattle and feeder cattle annually.
10. Identify and summarize poisonous plants and their effect upon beef cattle.
11. Outline the economic implication of shipping fever.
12. Describe the effects of internal and external parasites on beef cattle.
13. Describe the causes of beef cattle diseases.

Learning activities:

1. Conduct a panel discussion about the most common external and internal parasites.
2. Have individual class members present oral reports on assigned cattle diseases and have them include cause, symptoms, treatment, prevention, and control of each disease.
3. Prepare a chart about the economic losses of diseases categorizing by disease.
4. From symptoms given or seen in cattle, determine possible diseases and support your answer.
5. Make a list of health problems by cause under the headings of virus, bacteria, parasites, chemicals, poisons, injuries, and faulty nutrition.
6. Formulate a herd health program for your home farm, specifying prevention, control, and sanitation procedures.
7. Establish a worming program including the frequency of worming and the chemicals used.
8. Have a veterinarian as a resource person near the end of the unit to discuss questions students have prepared regarding diseases and sanitation.
9. Explain the causes and economic implication of Brucellosis and how effective calfhood vaccination is for beef cattle.
10. Prepare a display of the drugs and chemicals available to keep the herd healthy and list how each is used.
11. Explain or demonstrate the three ways injection may be given to animals (IV, IM, Interperoneal).

G. Housing and equipment for beef cattle

Competencies - the students will be able to:

1. Develop an efficient livestock facility on the farm or an example farm with a consideration for existing facilities.
2. Explain the necessity of a livestock handling facility (corral).
3. Design an efficient program of waste disposal.
4. Identify and summarize the use of the beef cattle equipment you deem necessary for producers in the community.
5. Explain the space requirements for shelter, water, and feeders per animal for beef of different ages.
6. Describe the special consideration in livestock buildings not considered for building with other uses.
7. Determine the benefits of confinement, pasture, and lot management of beef cattle.
8. Collect and display various workable examples of cattle facilities.

9. Explain the new feedlot facilities including slotted floors, manure disposal systems, and open fronted shelters for feeder cattle.

Learning activities:

1. Plan a livestock facility in relation to the existing home farmstead for 50 head.
2. Design a livestock handling facility listing the specifications.
3. Conduct a field trip viewing various waste handling systems and summarize each system.
4. Have student prepare a bulletin board of pictures of the minimum equipment every producer needs.
5. Have committee reports about the special provisions needed in livestock buildings.
6. Diagram a slotted floor or an open fronted confinement structure for feeder cattle, comparing the costs involved.
7. Compile information concerning manure disposal and laws affecting the various systems or alternative ways of disposing of cattle wastes.

H. Record keeping and analysis

Competencies - the students will be able to:

1. Maintain accurate production records for the breeding animals and for feeder cattle.
2. Budget the cost of maintaining a cow-calf herd for one year.
3. Analyze records at the end of the year to determine the average rate of gain, percentage of calf crop, and cost per pound of gain.
4. Calculate net and gross profit loss for each beef enterprise.
5. Use Instant Beef Performance Chart accurately.

Learning activities:

1. Develop proficiency in the use of the Instant Beef Performance Chart.
2. Using your supervised farming program record book records, budget your enterprise and calculate the profit (net and gross) for your beef or an example beef enterprise.
3. Identify the items which should be included in a livestock budget and prepare a budget for the entire feeding period for a specific group of cattle.

I. Marketing beef cattle (see Farm Business Management Guide - Marketing Management)

Competencies - the students will be able to:

1. Identify and summarize the benefits of the various methods of marketing livestock.
2. Describe the marketing cycle for cattle marketing to consumer.
3. Outline meat processing from marketing to the consumer.
4. Grade market live animals and grade carcasses of slaughtered animals.
5. Chart the price fluctuation in market cattle for five years.
6. Describe the importance of proper care and handling in marketing cattle from the home farm.

Learning activities:

1. Compare the prices for beef cattle at various markets in your home area.
2. Visit a terminal market and a cattle slaughtering facility.
3. Have a cattle buyer as a resource person to discuss the benefits of marketing by live weight versus grades and yield.
4. Have a panel discuss the effect of shrinkage upon the profit to the producer.
5. FFA members contact a slaughter processor as a resource person to discuss the economic loss to the beef industry from bruised carcasses. Students conduct discussion on proper handling of livestock to prevent bruises.
6. Take field trips to feedlot or central market and grade groups of market animals according to U.S. official grades.
7. Take field trip to processing plant to grade carcasses of slaughtered animals.

Instructional Aids

1. Insect, Tick, and Mite Pests of Livestock and Pets: The Ohio State Agricultural Education Curriculum Materials Service.
2. Castrating, Docking, and Dehorning: Illinois Vo-Ag Service 1032.
3. Judging Livestock, Illinois Vo-Ag Service 1019.
4. Managing the Beef Breeding Herd, Illinois Vo-Ag Service 1010a.
5. Cattle Grubs - slideset, Iowa Vocational Agricultural Teachers Association.
6. Twice a Day, Everyday - film, A. O. Smith Harvestore Products, Inc.
7. Confinement Systems for Beef - film, A. O. Smith Harvestore Products, Inc.
8. Charolais for Profitable Crossbreeding - film, Modern Talking Picture Service.
9. Advanced Livestock Production, University of Missouri.
10. Beef Cattle Breeds, Illinois Vo-Ag Service 1024.
11. Basic Curriculum Guide for Production Agriculture in Texas, Texas A&M University.
12. Oklahoma Vocational Agricultural Education Basic Core Guide, Oklahoma State University.
13. What Are Records Worth? Purdue University AS-338.
14. Urea for Beef Cattle, Purdue University AS-344.
15. Judging Steers - slideset, American Hereford Association.
16. Cattle Values in the Midwest - film, Nasco Company.
17. Beef Conformation - filmstrip, Iowa State University.
18. What's New in Beef Production - film, John Deere.
19. Beef Chart, National Livestock and Meat Board.

Dairy Cattle

Problem Areas

A. Selection of breeding stock
B. Feeding and management of producing herd
C. Feeding and management of calves
D. Control of diseases and parasites
E. Housing and equipment
F. Marketing
G. Record keeping and analysis

Competencies and Learning Activities

A. Selection of breeding stock

Competencies - students will be able to:

1. Identify major dairy breeds and describe important characteristics of each.
2. Identify parts of a dairy cow and explain their relationships.
3. Evaluate desirable conformation in areas of general appearance, dairy character, body capacity, and mammary system.
4. Use performance and pedigree information in selection of herd replacements.
5. Replace lower quality, lower producing animals with animals of desirable quality.
6. Identify and select for production and physical traits that are highly heritable.
7. Compare advantages and disadvantages of selecting grade versus purebred cattle.

Learning activities:

1. Evaluate dairy cattle using the unified score cards in determining desirable conformation and give an organized set of oral reasons.
2. Use transparencies to learn parts of dairy cow and bull, listing them on a worksheet.
3. Assign committees responsible to research and discuss important characteristics of each major breed.
4. Determine characteristics of animals on home farm which need improvement.
5. Students plan field trip to observe and evaluate animals of contrasting type in areas of general appearance, dairy character, body capacity, and mammary system.
6. Students bring in pedigrees of aged cows with production records. Compare and place, giving reasons for your ranking.
7. Students debate selection of purebred versus grade dairy cattle.

B. Feeding and management of producing herd

Competencies - students will be able to:

1. Develop production goals for producing herd.
2. Feed producing cows a balanced ration based on maintenance and production needs.
3. Prepare and feed an adequate ration to dry cows utilizing available feedstuffs.
4. Determine amount and kind of grain to feed.
5. Select protein supplements which balance home grown feeds at lowest cost per pound of protein.
6. Challenge feed the dairy cow to express her true genetic ability to produce milk.
7. Prepare and feed an adequate ration to herd sire.
8. Plan breeding program to assure year-round milk production.
9. Clip cow's tail, flanks, udder and underline.
10. Breed cows for 12 month calving interval.
11. Determine age at which to breed various breeds of dairy.
12. Explain function of the cow's udder.

13. Determine causes of dairy infertility.
14. Identify factors which influence bacteria growth and summarize control measures.
15. Explain approved practices for drying up the cow.

Learning activities:

1. Survey home farm and prepare list of approved practices which could improve production of dairy herd.
2. Determine nutrient requirements and calculate a balanced ration for both dry and producing cow.
3. Survey local community to determine availability of concentrates, supplements, and roughages.
4. Formulate least-cost rations to be used for the herd sire, dry cows, and producing cows on the home farm.
5. Make a drawing of the cow's udder and explain the functions of the various parts.
6. FFA officers arrange for a panel discussion on dairy breeding problems. Possible panel members could be local veterinarians, dairy producers and an artificial inseminator.
7. FFA Chapter conduct a dairy fitting and showmanship demonstration.
8. Student interview a DHIA supervisor discussing feeding practices as related to production.

C. Feeding and management of calves

Competencies - students will be able to:

1. Feed and care for cow and calf at calving time.
2. Assist in delivery of calf.
3. Disinfect calves navel.
4. Dehorn calves.
5. Remove extra teats on heifer calves.
6. Clean and disinfect calf stalls.
7. Explain the need of colostrum for newborn calves.
8. Estimate calf's weight with heart girth tape.
9. Prepare and feed a balanced ration to growing calves.
10. Compare the advantages and disadvantages of feeding whole milk versus milk replacer.
11. Fit and show a dairy heifer.

Learning activities:

1. FFA Chapter sponsor a fitting and showing demonstration.
2. Demonstrate the methods of dehorning calves and select one for use on home farm.
3. Assist a veterinarian in delivering a calf, disinfecting the navel, dehorning calves and removing extra teats.
4. Plan a panel discussion on management practices in raising calves.
5. Calculate least-cost rations, using available feedstuffs, for the dairy calf at different ages.
6. Students give oral reports in class on management practices they use on home farm.
7. Measure calf with heart girth tape and estimate weight. Weigh on scales to determine accuracy of measurement.
8. Prepare a display of various milk replacers which are commercially available.

9. Students debate benefits of feeding milk replacer to dairy calves.

D. Control of diseases and parasites

Competencies - students must be able to:

1. Diagnose cattle diseases and parasites and prescribe a treatment or preventative.
2. Identify the need of maintaining high sanitation standards and practices.
3. Use antibiotics and medications correctly in treating health problems.
4. Vaccinate, drench, spray, dust, or treat animals for specific diseases with specific controlling agents.
5. Define Brucellosis and summarize its implications upon the dairy herd.
6. Determine when a veterinarian is needed.
7. Explain how mastitis occurs and give methods of control.

Learning activities:

1. Prepare a chart showing major internal and external parasites, their symptoms, and methods of control.
2. Have a panel research and discuss the major infectious and noninfectious diseases, their causes, symptoms, and the method of control.
3. Develop practices to follow in establishing a program of disease and parasite prevention.
4. Develop a chart for life cycle of face fly and cattle grub.
5. Students interview local veterinarian on cassette tape about symptoms he looks for in diagnosing diseases.
6. Survey the home farm to establish disease or parasite problems and prescribe controls.
7. Observe and participate in vaccination, dusting, spraying, or drenching on a local farm.
8. From symptoms presented or observed, diagnose a dairy ailment and have veterinarian check your diagnosis.
9. Have students prepare oral report on Brucellosis and its effect upon the milk producer and how it is diagnosed.
10. Demonstrate the milk ring test.

E. Housing and equipment

Competencies - students will be able to:

1. Describe methods of manure disposal, giving advantages and disadvantages of each.
2. Evaluate home farm manure handling system and make plans for improvement.
3. Use milking equipment correctly.
4. Draw up plans for improving existing facilities or expanding with new facilities for a dairy herd on the home farm.
5. Construct an elevated calf stall.
6. Identify different housing systems, giving advantages and disadvantages of each.
7. Prepare a display of equipment needed for commercial dairy milk production.
8. Describe methods of milk handling, giving advantages of each.

9. Determine ventilation needs of home dairy barn and suggest those changes which should be made.
10. FFA members arrange for state inspector to talk about the regulations affecting Grade A milk producers.
11. Describe various feeding systems, their advantages and disadvantages.

Learning activities:

1. Write a report on different types of housing systems for dairy cattle, giving a cost analysis, and listing advantages and disadvantages of each system. Have students evaluate their peer's reports.
2. Study plans and construct a calf stall as needed on the home farm or for sale to dairy veal producers.
3. Identify methods of manure handling, giving a cost analysis and listing advantages and disadvantages of each system.
4. Have a committee research types of feeding systems, their advantages and disadvantages, and a cost study of each system.
5. Survey home farm, and list equipment needed to improve the dairy operation.
6. Have panel of students discuss the various ways of handling milk and the advantages of each.
7. Interview a competent dairy equipment salesman as to proper use of milking machine, and develop skills in using it.
8. Take a field trip to observe different types of housing and equipment in use on area dairy farms, including a Grade A producer, and evaluate each according to state regulations.

F. Marketing (see *Farm Business Management* Guide)

Competencies - students will be able to:

1. Identify the different methods of marketing milk and milk products.
2. Determine seasonal price differences for dairy products.
3. Determine markets available and pick one which will work best on home situation.
4. Compare methods of paying for milk and give advantages and disadvantages of each.
5. Outline the importance of producing Grade A milk.
6. Determine the importance of veal calf market.

Learning activities:

1. Write a report on the different methods of marketing dairy products.
2. Develop a chart showing seasonal price trends of dairy products.
3. Survey the community to identify the markets available for dairy products and list the advantages and disadvantages of each.
4. Interview the dairy producers in the community as to the size and economy of the veal calf market.
5. Calculate the net return in marketing milk on the home farm as Grade B and as Grade A milk.
6. Students set up a display of the various grades of milk and milk products available to the consumer.
7. Students plan a field trip to a milk processing plant to view their handling of milk and their grading of milk.

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G. Record keeping and analysis

Competencies - students will be able to:
1. Keep accurate production records to use in culling less profitable cows.
2. Keep accurate cow records pertaining to sire used, breeding date, calving date, ease of calving, veterinary treatment, and drying off dates.
3. Prepare and explain the importance of an enterprise budget.
4. Plan the budget for raising replacement heifers.
5. Describe the methods of individual identification and mark each animal by either eartag, tattoo, color markings, or brand.
6. Analyze individual records to improve productive efficiency of herd.
7. Define DHIA and explain its function and goals.
8. Prepare accurately breed registry application forms.

Learning activities:
1. Analyze individual records of home farm herd, comparing each cow's record with her dam at same age, previous lactation period, and herd average.
2. Prepare an enterprise budget for home farm herd estimating expenses and receipts.
3. Students present in a panel discussion the steps necessary to keep accurate and useable farm records.
4. Identify the various methods of animal identification and demonstrate the one of your choice, supporting your reason for choosing that method.
5. Demonstrate the procedure for weighing and recording a cow's production.
6. Have a Dairy Herd Improvement Association representative speak about the function of the organization.
7. Fill out the breed registration form for the breed on your home farm or on an example farm.

Instructional aids
1. Judging Dairy Cattle - film - University of Minnesota.
2. Selecting and Judging Jerseys - film - University of Minnesota.
3. Dairy Herd Improvement - film - University of Minnesota.
4. Dairy Cattle Type Comparisons---A Guide for Oral Reasons, Dr. John Sims, ISU.
5. Unified Score Cards (bull and cow).
6. Middle 15 Method for Balancing Protein for Dairy Cows, Dr. Kent Nelson, ISU.
7. Control and Prevention of Mastitis - slidefilm - Purdue University.
8. Correct Milking - film - Purdue University.
9. Dairy Cattle Sterility - slideset - Purdue University.
10. Dynamic Dairying - film - Purdue University.
11. Science of Profitable Dairying - film - University of Minnesota.
12. Care of the Newborn Calf - film - University of Minnesota.
13. Raising Dairy Calves - film - University of Minnesota.
14. Artificial Insemination - film - University of Minnesota.
15. Bovine Contagious Pleuro-pneumonia - film - University of Minnesota.
16. Dairy Cattle Sterility - slideset - Ohio State University.

17. Raising Dairy Replacements and Milk Production - production unit, University of Missouri.
18. Dairy Charts, National Livestock and Meat Board.
19. Approved Practices for Dairy, H-FH, Illinois Vo-Ag Service.

Horses

Problem Areas

- A. Principles of horse selection
- B. Caring for brood mare and foal
- C. Feeding horses
- D. Horse health
- E. Basic horsemanship
- F. Housing and equipment

Competencies and Learning Activities

A. Principles of horse selection

Competencies - students will be able to:

1. Identify and give advantages and disadvantages of common breeds.
2. Identify horse parts and use language commonly used in describing them.
3. Describe selection based on type, pedigree, show-ring winnings and/or performance testing.
4. Identify and describe five gaits of horses.
5. Recognize defects in conformation and movement.
6. Recognize unsoundnesses of sight and wind.
7. Determine age of horse by inspecting teeth.
8. Follow an organized logical sequence in evaluating horses.
9. Compare advantages and disadvantages of purchasing grade versus purebred.
10. Explain why selection based on show-ring winnings is of questionable value from a breeding standpoint.

Learning activities:

1. Use work sheets to identify and label parts.
2. With the aid of the all-breed horse score card evaluate a class of horses.
3. FFA members plan and stage a horse clinic with the primary purpose of learning skills necessary in horse evaluation.
4. Students attend a horse auction and prepare to explain reasons for price differential.
5. Observe horse judging at shows and fairs.
6. Students secure pedigrees and discuss their use in selection.
7. Students debate purchase of grade versus purebred.
8. Students compare advantages and disadvantages in purchase of horses using sex, age and amount of training as the means of comparison.

B. Caring for brood mare and foal

Competencies - students will be able to:

1. Determine time to breed mare so that foals arrive at a time when they can be exhibited to best advantage.

2. Explain the advantages of foaling in spring on clean open pasture.
3. Condition mare before breeding.
4. Explain need for exercising mare during pregnancy.
5. Recognize range in gestation period of horses.
6. Recognize signs of approaching parturition.
7. Disinfect the foaling stall, manger and grain boxes.
8. Explain the need for laxative feeds at foaling time.
9. Determine if mare is having normal presentation of foal.
10. Recognize danger of foal smothering if birth is delayed.
11. Administer artificial respiration if foal fails to breathe when born.
12. Recognize need for afterbirth expelled within six hours after foaling.
13. Explain factors governing kinds and amounts of feed used from foaling time to when mare is back on full feed.
14. Recognize value of colostrum and realize danger if meconium is not eliminated promptly from foal's bowels.
15. Administer an enema if foal fails to have bowel movement within 12 hours after birth.
16. Adjust mare's ration if foal is scouring and identify other possible causes of scours.
17. Formulate a palatable creep ration for foals.
18. Explain the need for varying foal's ration due to type of the animal, type of feed and development desired.
19. Halter break the foal after it has reached two weeks of age.
20. Recognize value of early training in providing for a better disciplined, more serviceable horse.
21. Be patient, gentle and firm in training the foal.
22. Explain factors which determine when and how foals should be weaned.
23. Identify and explain factors which determine time to castrate.
24. Describe a recommended procedure for drying up the mare.

Learning activities:

1. Students outline a production procedure using approved practices in caring for brood mare and foal.
2. Students plan a field trip to farm and arrange for owner to discuss management of brood mares and foals.
3. Have students with brood mares on home farm conduct a panel discussion on their experiences raising horses.
4. Student interview a veterinarian or horse-trainer and present information to the entire class.
5. Students conduct a horse clinic and arrange for a knowledgeable resource person to discuss this area of horse care.

C. Feeding horses

Competencies - students will be able to:

1. Recognize that satisfactory rations may be formulated from standard feedstuffs.
2. Establish nutrient requirements based upon weight and function of horse (e.g., maintenance, growth, work and lactation).
3. Using nutrient tables and feedstuff composition tables formulate rations to meet nutrient requirements regardless of size or stage of production.

4. Compare legumes with grass hays and give advantages and disadvantages of each.
5. Recognize need for vitamin and mineral supplementation when low quality hay is used.
6. Establish a daily schedule for feeding, making changes in ration on a gradual basis.
7. Establish a temporary pasture and explain value of good pasturage.
8. Realize that adequate nutrition is essential to the health and well-being of the horse.
9. Estimate the feed cost by preparing an itemized budget.
10. Recognize the desirability of encouraging horses to drink before feeding rather than after.

Learning activities:

1. Use work sheets to formulate rations.
2. Write an evaluation of a field trip which was designed for the purpose of observing feeding practices.
3. Discuss the value of a rotated legume pasture as compared to a permanent pasture.
4. Have students relate to the group the feeds and feeding methods used in their supervised farming program.
5. Survey horse producers in the community regarding their feeding practices and decide if they are practicing good nutrition.

D. Horse health

Competencies - students will be able to:

1. Outline a sanitation and disease prevention program designed to protect health of horses.
2. Explain need for maintaining stable temperature similar to outside temperature.
3. Establish a worming program for horses raised on home farm.
4. Identify bot fly egg deposits and describe control methods recognizing timeliness of treatment.
5. Recognize external parasite infestation and recommend methods of control.
6. Examine teeth and float if necessary.
7. Explain how daily grooming is associated with maintaining health.
8. Demonstrate the proper procedure in cleaning horse's feet.
9. Identify common faults in stance and trim feet to correct the fault.
10. Identify four kinds of corrective shoes and describe purpose of each.
11. Explain how dry hoofs can be prevented and select a method for use on your horse.
12. Shoe a horse or recognize need for having horse shod.

Learning activities:

1. With the aid of the veterinarian organize a sanitation and disease prevention program that could be used on home farm.
2. Assign students to study various common diseases that affect horses and have them give reports to the class.
3. Field trip to observe farrier shoeing a horse.

4. Student collect materials for a first aid kit that would be desirable to use on home farm for maintaining health of horses.
5. Student arrange for demonstration on floating teeth and cleaning feet.

E. Basic horsemanship

Competencies - students will be able to:
1. Train horse to circle using a lunge line and light whip.
2. Demonstrate proper method of bridling and saddling.
3. Demonstrate proper procedure in removing bridle and saddle.
4. Demonstrate proper method of mounting and dismounting.
5. Explain how position of rider in saddle is important for correct use of aids in maintaining balance and rhythm for ease of riding.
6. Demonstrate how voice, hands, legs and weight of rider are basic aids in controlling horses.
7. Train horse to neck rein, back and move from one gait to another in a smooth manner.
8. Fit a horse for show.
9. Identify and explain factors necessary in proper halter showing.
10. Give a speech on basic safety rules for handling horses.
11. Tie and use the bowline, crown, cinch and manger knots.

Learning activities:
1. Students arrange a demonstration on fitting and showing horses.
2. Students attend horse show and observe differences in horses' response to riders' commands.
3. Arrange for experienced horse trainer to demonstrate proper skills used in training and handling horses.
4. Observe films and slide films on horsemanship.
5. Students collect articles on accidents with horses and give oral reports to class.
6. All students work in preparation of horse safety guidelines.
7. FFA members organize and conduct a horse show.
8. All students tie knots as listed in competency 11.

F. Housing and equipment

Competencies - students will be able to:
1. Choose a style for the barn or other buildings that fits the site and is in harmony with the surroundings.
2. Decide on the number of animals to be handled and on how they will be housed.
3. Determine the total amount of barn space needed to stable and care for the animals.
4. Figure the amount of space needed under roof for separate but associated buildings; for example, open shelters, riding arena, equipment storage, exercise area, and feed storage.
5. Determine amount of space needed for open and fenced areas for pleasing appearance, fire protection, and future expansion.
6. Compare alternative housing arrangements and select those most suited to the situation.
7. Investigate methods and plan of manure storage and disposal.

8. Recognize need to check on building codes and zoning regulations. (Refer to Land Use Planning unit in Agriculture Resources and Conservation Guide).
9. Identify different sources of fencing materials and give advantages and disadvantages of each.
10. Identify three styles of bits and explain purpose of each style.
11. Construct a saddle storage rack for use on home farm.
12. Arrange a tack room to meet needs of horse enterprise on home farm.
13. Clean and oil leather equipment and replace worn parts of gear.
14. Build a show box.

Learning activities:

1. Class members look into building codes, zoning regulations, and any other local restrictions that may affect development, construction, or use of facilities.
2. Collect ideas on horse facilities from publications, tours, visits to existing layouts, and from experienced horsemen.
3. Prepare an equipment display labeling the items and indicate purpose or function of each.
4. Have students prepare an itemized list of essential equipment and estimate cost of equipping the home farm with the list you have prepared.
5. Observe several makes of horse trailers and compare the advantages and disadvantages of each.

Instructional Aids

1. The Horse America Made, The All American Horse, The Greatest Horse on Earth - films - Venard.
2. Suggestions for Buying and Judging Horses - Circular 1057 - Illinois.
3. Selecting, Feeding and Caring for Light Horses - VAS 1040 - Illinois.
4. Horses and Horsemanship - VAS 1047 - Illinois.
5. Quarter Horses at Halter, Roping, Cutting, Reining - film - ISU Film Library.
6. Rations for Horses - AS - 387 Iowa State University.
7. Caring for the Brood Mare and Foal - VAS 1041 - Illinois.
8. Horse Handbook - MWPS - 15 - University of Illinois.
9. Horse Safety Guidelines - U.S. Department of Agriculture.
10. American Quarter Horse - chart - American Quarter Horse Association.

Poultry

Problem Areas

A. The poultry industry
B. Selecting chicks and birds for production
C. Feeding and managing the laying flock
D. Feeding and managing young chickens
E. Turkey production and management
F. Marketing
G. Control of diseases and parasites

Competencies and Learning Activities

A. The poultry industry

Competencies - students will be able to:

1. Identify and summarize the number and trends of the poultry industry in the community and state.
2. Outline egg production for the past 10 years in the state and nation.
3. Describe the changes in the per capita consumption of poultry and poultry products.
4. Compare the nutritional benefits of turkey and chicken meat with pork, beef, and lamb.
5. Explain the advantages and disadvantages of poultry farming.

Learning activities:

1. Debate the advantages of poultry production in the community.
2. Prepare a series of charts of the changes in poultry consumption, production numbers, and egg production.
3. Conduct a panel discussion comparing poultry with other meat products available to the consumer.
4. Survey the home farm and community for the existing poultry operations and the potential of increased operations.
5. Visit a store meat counter and compare prices of poultry with other meats.

B. Selecting chicks and birds for production

Competencies - students will be able to:

1. Identify the poultry breeds, their origins, and the main characteristics of each.
2. Describe the four classes of chickens.
3. Explain the factors to consider in choosing a breed for the type of production desired.
4. Describe the differences in poultry reproduction and reproductive tracts compared to other farm animals.
5. Describe the role of the National Poultry Improvement Plan.
6. Explain how poultry are sexed, culled, and selected for laying production versus broiler production.
7. Compare the characteristics of pullets and hens for egg production with broiler breeder females.
8. Determine the nomenclature and language of birds and poultry products.
9. Evaluate poultry using the selection grading card and the egg production card.

Learning activities:

1. On a worksheet of a chicken, label the parts using the correct nomenclature.
2. Have each student report on one breed of poultry, including its class, characteristics, and origin.
3. Interview poultry producers on cassette tapes concerning factors to consider in the selecting of birds for production.
4. Compare in a paper the differences in reproduction and in the reproductive organs of poultry versus other farm animals.

5. Have a representative from the National Poultry Improvement Association report to the class upon the changes in poultry due to the organization.
6. Have students preview a film and lead the discussion dealing with poultry.
7. Evaluate a class of poultry giving reasons for your placement.
8. Demonstrate the culling of chickens using accepted procedures.
9. Have students plan a field trip to a poultry show and upon their return summarize the value in showing practices and the care of birds before, during, and after showing.
10. Fit and show a poultry animal.

C. Feeding and managing the laying flock

Competencies - the students will be able to:
1. Describe the nutrient requirements of poultry as it relates to the egg producing flock.
2. Formulate a ration using feedstuffs produced on the home farm based on the production level of the birds.
3. Summarize the methods of increasing profit of the laying flock.
4. Outline production efficiency standards student would employ on his home farm.
5. Compare pullet versus hen flocks for production, feed, and housing requirements.
6. Compile publications and sources about the various ways of housing poultry and list the equipment needed and specify the space required.
7. Explain the systems of feeding chickens.
8. Describe molting and its effect upon egg production.
9. Discuss the importance of records in poultry products.

Learning activities:
1. Prepare a chart of the nutrient requirements for pullets and hens producing at different levels.
2. Conduct an experiment feeding various rations which the students have formulated to chickens and compare the results.
3. Get class consensus regarding the main methods of increasing profits in the laying flock.
4. Visit various laying flocks and summarize the housing and equipment of each enterprise.
5. Compare the laying flocks visited for efficiency in production and evaluate your home farm poultry operation on that basis.
6. Predict the economic losses in production due to seasonal molting of poultry.
7. Have class members report on the role of records in poultry production.

D. Feeding and managing young chickens

Competencies - students will be able to:
1. Describe the use of incubators in poultry production explaining the necessity of moisture and optimum temperatures.
2. Outline the parts of the egg and describe a chick in development.
3. Explain the necessity of a brooder for young chicks.

4. Analyze the various brooder houses and determine the one which would work best into existing farm situations.
5. Calculate the minimum costs of equipment needed for a poultry flock of 50 birds.
6. Describe proper feeding of small chicks, including amount and rations available.
7. Explain the most common brooding problems with poultry.
8. Outline the housing, equipment, feeding, rations, and requirements for both broilers and potential breeding birds.
9. Describe the economics of capon production.
10. Compare confinement operation with range operation for growing birds.

Learning activities:

1. Have students incubate eggs, break at various stages and discuss the chick's development.
2. Have committee reports on the use of pastures in production, raising of birds, equipment needed in poultry production, and types of housing for poultry, including the costs involved.
3. Demonstrate, or describe orally, the act of caponizing chickens.
4. Compare on the chalk board differences in rations for two classes of chickens, one of which is destined for breeding and the other for broilers.
5. Have a class panel discuss the importance of incubators and brooders for poultry specifying their function and the management of them needed.
6. Collect pictures of various brooder house plans and display on a bulletin board.
7. View a poultry producer who raises breeder chickens. Summarize his operation, his handling of fertile eggs, and shipment of chickens.
8. Describe the process of egg development within the hen.
9. Demonstrate the process of debeaking chicks.

E. Turkey production and management

Competencies - students will be able to:

1. Identify the turkey breeds in the United States and describe their characteristics recognizing the advantages and disadvantages of each.
2. Outline a plan for successful brooding of turkey poults.
3. Describe the turkey production cycles in Iowa.
4. Compare turkeys with chickens for efficiency of feed utilization.
5. Outline management programs for raising turkeys on the range and in confinement.
6. Choose the breed of turkey best adapted to an area and home farm and support your decision.
7. Define the tests of the Council of American Official Poultry Tests and discuss their function in relation to turkeys.
8. Design a set of plans for equipment and shelters for turkeys.
9. Formulate a ration for turkeys at various stages of production.
10. Explain the importance of controlled lighting for the toms and hens in the breeding flock.
11. Describe the place of antibiotics and arsenicals in turkey production.

Learning activities:

1. Construct a turkey feeder from a design that is provided.
2. Prepare a chart with pictures of turkey breeds and include the advantages and characteristics of each breed.
3. Visit a turkey producer and outline how that operation might be improved.
4. Diagram the turkey production cycle for Iowa and compare numbers for the past 5 years.
5. Have a class debate on the comparison of feed efficiency of turkeys versus chickens.
6. Develop a list of management practices for turkey raising in confinement and on the range for a given farm.
7. Select turkeys on the basis of physical appearances on a turkey farm and present reasons for your choice.
8. Interview turkey producers about the role of the Council of American Official Poultry Tests.
9. Prepare and display turkey rations for various stages of production.
10. Determine the effect of changes in lighting upon breeding toms and hens.
11. Have a committee report on the place of antibiotics and arsenicals in turkey rations.
12. Survey the area for location suitable for turkey production and defend your decision.
13. Prepare video tape reports of artificial insemination in turkey production.
14. Define the advantages of rearing sexed poults.

F. Marketing

Competencies - students will be able to:

1. Describe the three major marketing problems confronting poultry producers.
2. Diagram the price trends in egg production.
3. Identify the classes and grades of eggs and explain the differences among them.
4. Describe recommended practices in maintaining egg quality.
5. Explain the state laws concerning eggs.
6. Describe the market classes of poultry and define the characteristics of each.
7. Determine the methods of marketing poultry from the home farm.
8. Identify the standards of quality and the grades of dressed and ready-to-cook poultry.
9. Discuss the advantages and disadvantages of selling eggs by grade.
10. Explain the importance of maintaining accurate records in poultry production and marketing.

Learning activities:

1. Discuss with poultry producers their major marketing problems.
2. Have a state inspector as a resource person discuss grading poultry and eggs and laws concerning the marketing of those products.
3. Students plan field trip to a poultry processing facility.
4. Demonstrate methods of and/or steps of maintaining egg quality.

5. Students preview and lead the discussion on films concerning marketing methods.
6. Develop a display of various egg grades listing the differences.
7. Debate the advantages and disadvantages of marketing eggs by grade.
8. Describe the characteristics which determine when poultry are ready for market.
9. Dress a turkey or chicken and identify the body parts and meat parts.
10. Candle eggs.
11. FFA members prepare a breakfast for school faculty using poultry products.

G. Control of diseases and parasites

Competencies - students will be able to:

1. Explain the annual loss each year due to diseases and parasites of poultry.
2. Identify the diseases of poultry which have the most economic impact upon the poultry industry.
3. Explain the effect of pullorum, coccidiosis, Newcastle disease, lymphomatosis, bronchitis, fowl pox, blue comb, blackhead, CRO. infectious synovities, and other common diseases upon poultry, listing their symptoms, causes, prevention, and treatment.
4. Demonstrate worming a chicken,
5. Estimate the annual losses due to poultry parasites.
6. Identify the poultry diseases which may be transmitted through the egg from parent to offspring.
8. Fumigate a poultry house.

Learning activities:

1. Illustrate graphically the economic losses of specific diseases and parasites in poultry.
2. Have individual students present oral reports about an assigned disease or parasite including the cause, symptom, prevention, and treatment.
3. Demonstrate and/or orally describe a sanitation program for the home farm.
4. Select a panel to present the dangers of infectious diseases in poultry flocks.
5. Interview poultry producers about their disease preventative program.
6. Post a bird.
7. Demonstrate the fumigation of a poultry facility noting the precautions involved.

Instructional Aids

1. Poultry Chart, National Livestock and Meat Board.
2. Oklahoma Vocational Agriculture Education, Basic Core Curriculum, Oklahoma State University.
3. Instructional Materials for Vocational Agriculture, Texas A & M University.
4. Design for More Eggs - film, Union Pacific Railroad.
5. Today's Chicks - film, Purdue Audio-Visual Center, Purdue University.

6. Broiler Country - film, Elanco Products Division.
7. Insect, Tick, and Mite Pests of Livestock and Pets, Ohio State University.
8. Judging and Grading Poultry and Eggs, Illinois Vo-Ag Service.
9. Poultry Judging, Ohio State University.

Sheep

Problem Areas

A. Selection of breeding sheep
B. Feeding and management of breeding flock
C. Feeding and management of feeder lambs
D. Control of diseases and parasites
E. Housing and equipment
F. Marketing
G. Record keeping and analysis

Competencies and Learning Activities

A. Selection of breeding sheep

Competencies - student will be able to:

1. Identify and explain advantages and disadvantages of common breeds.
2. Estimate size for age.
3. Recognize unsoundness with special emphasis on mouths and udders.
4. Recognize desirable conformation.
5. Select a ram with traits superior to the ewes, recognizing the ram has an influence on all of his progeny.
6. Identify production and carcass traits that are highly heritable.
7. Use performance records and pedigree information in selection of animals.
8. Determine age by examining teeth.
9. Recognize dense, uniform, high-quality fleece.

Learning activities:

1. Each student with aid of references identify and label parts of a ewe.
2. Students write letters to breed associations requesting information for classroom use.
3. Use slidefilms for breed identification and distinguishing. characteristics.
4. Individual students with sheep enterprises will develop a program of sheep improvement and relate their experiences to the class.
5. Field trips to local farms, seed stock producers, sheep day conferences, central market or packing plant.
6. Observe a flock after lambs have made considerable growth and determine which, if any, desirable traits were contributed by the ram.
7. Evaluate classes of rams and ewes with students presenting an oral set of organized reasons.

B. Feeding and management of breeding flock

Competencies - the student will be able to:

1. Select desirable goals for a student managing a ewe flock.
2. Plan a worming program to fit the home farm.
3. Flush ewes ten days to two weeks before breeding.
4. Explain value of shearing ram before breeding season.
5. Select recommended rations for ram during breeding season, ewes in various stages of gestation, lactating ewes, and creep ration for lambs.
6. Recognize that rations for sheep can be simple, but they must be adequate.
7. Recognize the need for avoiding any practice that would cause ram to be overheated.
8. Trim hoofs of ram and ewes prior to breeding.
9. Use marking paint on ram or install marking harness.
10. Change color of paint each 17 day period.
11. Determine proper ram-ewe ratio.
12. Remove large locks of wool or dung tags about the tail and hind quarters of ewes prior to breeding.
13. Plan the breeding program to fit the facilities of home farm.
14. Compare advantages and disadvantages of using hormones in the reproductive process.
15. Compare advantages and disadvantages of methods of administering hormones.
16. Explain why you would or would not attempt an accelerated lambing program.
17. Manage flock so that 150-pound ewes gain 25 pounds between breeding and lambing.
18. Adjust ewes ration six weeks before first lambs are due.
19. Provide a moderate amount of regular exercise for ewes during winter.
20. Explain the need for clean ice-free water as an important nutrient.
21. Cull ewe flock discarding those with poor udders, unsound mouths and any that have been unsatisfactory producers.
22. Recognize signs of approaching parturition of pregnant ewes.
23. Place ewe in lambing pen and assist with lambing if necessary.
24. Reduce grain for ewes and provide warm water at lambing time.
25. Warm chilled lambs and assist weak lambs in nursing.
26. Explain value of colostrum milk for newborn lambs.
27. Check ewes udder and open teats, if necessary.
28. Develop a plan to save "extra" lambs or orphan lambs.
29. Provide a creep when lambs are two weeks of age.
30. Dock and castrate lambs.
31. Identify (ear tag or paint brand) ewes and lambs.
32. Identify ewes that are cull candidates.
33. Condition ewes for weaning.
34. Select replacement ewe lambs and separate from market lambs.
35. Shear ewes recognizing the value of doing it before lambing.
36. Group small number of ewes with their lambs separating those nursing singles from those with twins and adjust ewes ration accordingly.

Learning activities:

1. Prepare a paper on sheep nutrition as it applies to the feeds available on the home farm.

2. FFA officers arrange for an experienced sheepman to speak at regular FFA meeting or day school class period.
3. Use filmstrips for learning breed identification and body parts.
4. With the aid of references, class members prepare a "calendarized" management program designed to improve the sheep enterprise on home farm.
5. Field trip to observe management practices of an outstanding seed stock producer or owner of a good commercial flock.
6. Use video tape to demonstrate (e.g. fitting an animal for show, docking lambs, shearing ewes, trimming feet, worming).
7. All students prepare a list of goals for a ewe flock enterprise.
8. Use a tape recorder and have a student interview a veterinarian regarding use of hormones in the reproductive process of sheep.
9. FFA members organize a sheep shearing school.

C. Management of feeder lambs

Competencies - students will be able to:

1. Investigate types of lambs available, recognizing desirable traits and advantages and disadvantages of breeds.
2. Realize native lambs are often heavily parasitized.
3. Explain advantages and disadvantages of purchasing preconditioned lambs.
4. Explain need for rapid transport from range to feedlot with rest period after arrival.
5. Determine the level of parasitic infestation and treat when necessary.
6. Vaccinate for enterotoxemia.
7. Place on feed cautiously recognizing advantages of using antibiotics.
8. Isolate sick and weak lambs.
9. Use a ration commensurate with size and age of lambs.
10. Identify factors to consider in deciding to shear or not shear feeder lambs.
11. Treat cases of sore mouth.
12. Develop a feeding program according to a plan and observe how lambs are handling the feed.
13. Realize that no two groups of lambs feed exactly alike.
14. Compare advantages and disadvantages of hand feeding versus self-feeding.
15. Determine if the additional cost of pelleted feed would be desirable.
16. Compare advantages and disadvantages of low-fiber, high-energy rations.

Learning activities:

1. Using references summarize advantages and disadvantages of common types of available feeder lambs.
2. Students arrange field trip to lamb feeder with a prepared list of questions involving selection, feeding and management of feeder lambs.
3. Student preview film on sheep industry and conduct class discussion after showing film.
4. Students plan a production procedure guide for improving feeder lamb enterprise on home farm.

5. Each student use worksheet to budget the feeder lamb enterprise as a possible choice for a supervised program on home farm.
6. Invite local elevator fieldman to discuss feeding programs and rations.
7. Students debate hand-versus self-feeding.
8. Examine eye membranes of feeder lambs to determine if worming is necessary. Discuss the advantages and disadvantages of various products used for worming.
9. FFA chapter feed a pen of lambs on school farm.

D. Control of diseases and parasites

Competencies - students will be able to:

1. Explain the life history of a common stomach worm of sheep.
2. Recognize symptoms of parasitic infestation.
3. Prepare a phenothiazine mixture and drench sheep according to size and age.
4. Explain the need for using more than one kind of wormer.
5. Describe the life cycle of nodular worms, tapeworms, small intestinal worms, lungworms and whipworms.
6. Summarize a planned program of controlling internal parasites.
7. Recognize symptoms of pregnancy disease; explain the cause and prescribe measures for prevention and treatment.
8. Vaccinate for overeating (enterotoxemia).
9. Recognize sore mouth and determine if vaccination of entire flock is necessary.
10. Treat animals that have foot rot.
11. Prescribe methods of preventing and treating bloat.
12. Realize the need for observing animals for symptoms of tetanus expecially after docking and castrating.
13. Compare methods of docking and castrating giving the advantages and disadvantages of each.
14. Select approved insecticides for control of external parasites.
15. Dip or spray sheep.
16. Detect mastitis and treat problem cases.
17. Identify poisonous plants which cause losses in sheep.

Learning activities:

1. Have veterinarian perform a postmortem on sheep infested with internal parasites. Have students outline a planned program for parasite control on home farm.
2. Student write to state veterinarian or chief of Division of Animal Industry of Iowa inquiring as to the prevalent sheep disease problems in the state.
3. Discuss the monetary losses to the sheep industry from diseases and parasites.
4. Students write reports on causes for condemnation of lamb and mutton carcasses.

E. Housing and equipment

Competencies - student will be able to:

1. Compare advantages and disadvantages of confinement systems of sheep production.
2. Realize that it is unnecessary to have fancy buildings or high-priced equipment in order to raise healthy she

3. Determine shelter, lots and grain storage space requirements.
4. Construct panels for lambing pens.
5. Construct hay and grain feeders, mineral feeders, and a creep feeding area.
6. Compare the advantages and disadvantages of fencing materials for sheep confinement and predator control.
7. Erect an electric fence.
8. Explain the use of shearing, marking and identification equipment as required in managing the sheep enterprise.
9. Prepare an inventory of all sheep equipment which would be essential for a successful supervised farming program involving a ewe flock.

Learning activities:

1. Field trip to observe facilities and equipment of a successful sheep producer.
2. Use references solving problems on space required for shelter, lots, and feeding equipment.
3. Student prepare a display of equipment used for fitting and showing sheep.

F. Marketing

Competencies - students will be able to:

1. Explain how supply and demand influence prices received for sheep.
2. Identify classes and grades of slaughter sheep and grades of lamb carcasses.
3. Describe "hothouse" lamb production as related to marketing.
4. Identify wholesale and retail cuts of lambs recognizing those which are of most value.
5. Realize the importance of a good job of selling.
6. Compare advantages and disadvantages of selling to packer, through commission firm, through a dealer, order buyer and cooperative marketing.
7. Summarize advantages and disadvantages of rail grading.
8. Identify and explain factors which affect shrinkage.
9. Explain the sheep cycle as related to marketing.
10. Discuss seasonal fluctuation of prices as they relate to slaughter lambs, ewes and feeder lambs.
11. Justify your selection of method of marketing.
12. Compare advantages and disadvantages of selling purebred sheep at auction versus private selling.
13. Condition purebred animals for sale.
14. Determine the numbers of finished slaughter lambs that would be a recommended load for a given size truck or rail car.
15. Describe what you would do to prevent car sickness when shipping sheep.
16. Identify factors which determine grades of wool.
17. Explain how shrinkage is determined in handling of wool.
18. Discuss the various methods a grower may use to sell his wool.
19. Recognize defective and off-type wool.
20. Explain the three major factors considered in the evaluation and classification of wool.

Learning activities

1. Students arrange trip to farm and grade lambs that are about to be sold. Follow up with a trip to processing plant to observe and evaluate carcasses. Instructor should caution the students on proper handling of live animals in the prevention of bruises.
2. FFA members conduct a judging contest including live animals, lamb carcasses, fleeces, and identification of retail cuts. Use equipment and supplies pertaining to sheep for awards.
3. Have students record interviews with a packer buyer, a commission buyer, order buyer and use for class discussion on marketing.
4. Students survey sheep producers and obtain views regarding selling direct versus rail grading.
5. Students estimate shrinkage on a load of slaughter lambs. Observe the lambs before loading and each student submit an estimate in writing. Award a choice lamb chop to the one having the closest estimate.
6. Use charts to show seasonal price trends and have students chart the daily market. Perhaps the FFA chapter could purchase a radio for classroom use if one is not available.
7. Debate selling purebred sheep by auction versus private treaty.
8. FFA chapter conduct a bred ewe sale.
9. Have students measure size of truck or rail car and determine number of 100 pound slaughter lambs that can be shipped.
10. FFA officers arrange for a representative of the cooperative wool marketing association to present a talk on wool marketing.

G. Record keeping and analysis

Competencies - the student will be able to:

1. Prepare a budget of estimated expenses and receipts for a sheep enterprise on home farm.
2. Register an animal with breed association.
3. Explain value of good records for culling and establishment of credit rating.
4. Determine kinds of records to keep.
5. Enter accurately all items of income and expense.
6. Tattoo an animal.
7. Prepare an inventory.
8. Analyze record of home farm sheep enterprise and determine strengths and weaknesses.

Learning activities:

1. All students use worksheets in preparing an estimate of expenses and receipts of ewe flock and feeder lamb enterprise.
2. Use transparencies to show record forms and types of records.
3. Field trip to home farm of a student and all members prepare an inventory of the sheep enterprise.
4. Have students bring pedigrees to class and discuss their value. Have students explain proper method in application for registry.
5. Demonstrate the proper installation of a ram harness and need for changing color each 17 days.
6. Demonstrate the ear tagging or paint branding of sheep.

7. Students report on birth weight of lambs, fleece weight of ewes, number of multiple births. Determine lambing percentage of each flock represented in the class.
8. FFA officers arrange for a banker or PCA representative to discuss records and their value.
9. Analyze a set of records and discuss their use in improvement of sheep enterprise.

Instructional Aids

1. Winning the Worm War - film, Public Relations Department, Indiana Farm Bureau Cooperative Association, Inc.
2. Lamb Grading - slideset, Agricultural Education Department Teaching Materials Center, Texas A & M University.
3. Sheep Meet the Challenge - film, ISU Media Resources Center.
4. Culling Sheep - film, Union Pacific Railroad.
5. Sheepmen USA - film, ISU Media Resources Center.
6. Diseases of Sheep - film, ISU Media Resources Center.
7. Internal Parasites of Sheep - VAS 1005, Illinois.
8. Diseases of Sheep, VAS 1004, Illinois.
9. The Sheepman's Production Handbook - Sheep Industry Development Program, Colorado.

Swine

Problem Areas

- A. Selection of breeding and feeding stock
- B. Feeding and management during breeding
- C. Feeding and management during gestation
- D. Feeding and management during farrowing and lactation
- E. Feeding and management from weaning to market
- F. Control of diseases and parasites
- G. Housing and equipment
- H. Marketing
- I. Record keeping and analysis

Competencies and Learning activities

A. Selection of breeding and feeding stock

Competencies - students will be able to:

1. Identify and give advantages and disadvantages of common breeds.
2. Identify and explain relationships among principal body parts.
3. Identify production and carcass quality traits that are highly heritable.
4. Recognize desirable conformation.
5. Recognize common faults in conformation.
6. Identify wholesale cuts of a market hog.
7. Make a backfat probe on swine.
8. Explain place of ultrasonics in selection of breeding stock.
9. Estimate age of swine at 200 pounds.
10. Adjust depth of backfat probe to 200 pounds.
11. Use performance records and pedigree information in selection of animals.

Learning activities:

1. Field trips - local farms, seed stock producers, boar testing stations, central market or packing plant.
2. Use slides and film strips which demonstrate breed characteristics.
3. Use overhead and charts showing parts of animal.
4. Compare breed summaries of swine testing stations and National Barrow Show.
5. Identify at least one good supplier herd for each of the major breeds within 100 miles of local community.
6. Demonstrate probing and assist students in probing animals.
7. Demonstrate use of ultrasonics in breeding stock selection.
8. Students debate advantages and disadvantages of various breeds of swine.
9. Students conduct a discussion on selecting breeding stock based on pedigrees and performance testing.

B. Feeding and management during breeding

Competencies - students will be able to:

1. Explain methods of maintaining optimum temperature of boar during the breeding season.
2. Determine optimum number of gilts and sows for use with boars of different ages.
3. Explain flushing and give its advantages and disadvantages.
4. Design and feed an adequate flushing ration.
5. Use the Pierson square method to balance rations for protein content.
6. Explain artificial insemination and give its advantages and disadvantages.
7. Compare advantages and disadvantages of hand breeding versus pasture breeding.
8. Identify factors which cause infertility and explain measures to minimize the problem.
9. Explain the procedure of superovulation and its advantage.
10. Discuss different breeding and farrowing schedules and advantages of each.
11. Determine the age to breed gilts and the optimum time during estrus to breed.
12. Explain the various methods of estrus synchronization.

Learning activities:

1. Outline an accepted procedure for handling a newly purchased boar.
2. Use charts or transparencies showing the reproductive tracts of male and female swine.
3. Students conduct a survey of local community regarding mating systems used. Summarize and present findings to the class.
4. Study university research on artificial insemination and use of frozen semen and make a written report on how they could be used in a swine breeding program.
5. Use the tele-lecture to ask questions of university or swine extension personnel concerning swine breeding management.
6. Plan a breeding and farrowing schedule which best meets needs of home farm.

7. All students work problems using Pierson square method of balancing rations.

C. Feeding and management during gestation

Competencies - students will be able to:

1. Prepare a gestation ration utilizing home grown feeds and an approved commercial supplement.
2. Explain individual stall feeding and give the advantages and disadvantages.
3. Determine the condition of pregnant gilts as to over or under weight, and propose corrective measures.
4. Define the benefits of the feeding of silage to bred females, and give precautions which should be noted.
5. Explain how to use pasture as a supplement to feeding pregnant sows and gilts.

Learning activities:

1. Study research concerning self-and stall-feeding for females, and list the advantages of each.
2. Student reports on management practices used on home farm.
3. Interview area livestock specialists concerning feeding and management of the bred sow or gilt.
4. Formulate a gestation ration which meets the nutrient requirements of the bred gilt or sow.
5. Survey methods used in the community to feed bred sows and gilts including percent of protein in the ration, pounds of feed fed daily, etc.
6. Use slideset on how feeding and management affect a sow's reproduction.
7. Students preview films and conduct class discussion.
8. Students debate self-feeding versus hand feeding.

D. Feeding and management during farrowing and lactation

Competencies - students will be able to:

1. Determine when to bring bred sows and gilts into the farrowing house.
2. Wash the bred female with the proper disinfectant.
3. Formulate and feed a ration which meets the needs of the lactating sow.
4. Formulate and feed a creep feeding ration for pigs still with the sow.
5. Castrate pigs before weaning.
6. Accomplish the following with piglets: clipping needle teeth and tails, ear notching, and giving iron shots and give the time each should be done.
7. Determine hardness of udder and lack of milk production.
8. Explain use and importance of colostrum.
9. Determine causes of baby pig mortality.

Learning activities:

1. Develop a detailed management program listed on a daily basis from time sow is penned up until pigs are weaned.
2. Calculate and balance a least-cost ration for the lactating sow using available feedstuffs.

3. Field trip - demonstrate castrating, ear notching, giving iron shots, clipping needle teeth, clipping tails.
4. Video tape a sow farrowing. Students prepare script explaining need for removing mucus, prevent chilling and disinfect navel.
5. Interview veterinarian regarding use of hormones at farrowing time.
6. Discuss the benefits of a sow milk replacer.
7. Write a paper on management practices which would aid in improving home farm swine enterprise.

E. Feeding and management from weaning to market

Competencies - students will be able to:

1. Determine the nutrient requirements for 40-80 pounds, 80-120 pounds, and 120-200 pound hogs.
2. Formulate and feed balanced rations for 40-80 pounds, 80-120 pounds, and 120-200 pound hogs.
3. Compare full and limit feeding.
4. Explain the importance of rate of gain and feed efficiency and measure these traits.
5. Select and make efficient use of additives in rations for weaning pigs and market hogs.
6. Compare the advantages and disadvantages of pasture and confinement feeding.
7. Plan and carry out a pasture feeding program.
8. Plan and carry out a confinement feeding program.
9. Calculate price to pay for feeder pigs to have a profitable enterprise.
10. Provide facilities to assure an adequate supply of clean water.

Learning activities:

1. List efficiency goals which swine producers should obtain.
2. Formulate a least-cost balanced ration for the following weight groups: 40-80 pounds, 80-125 pounds, and 125-200 pounds.
3. Students debate confinement versus pasture feeding.
4. FFA officers arrange panel discussion involving farmers who raise swine and those who purchase feeder pigs.
5. Individual students develop plan for measuring feed efficiency.
6. Use a worksheet to calculate price to pay for feeder pigs.

F. Control of swine diseases and parasites

Competencies - students will be able to:

1. Determine the symptoms, causes, prevention and cures (where they apply) of swine diseases and parasites.
2. Treat worm problems with recommended wormers.
3. Describe the life cycle of roundworms, lung worms, flies, and lice.
4. Identify those diseases which cause the most loss in the swine industry.
5. Describe the use of isolation in the control or prevention of infectious diseases.
6. Determine management practices that will aid in preventing and controlling animal diseases and parasites.

7. Vaccinate animals.
8. Treat animals for various internal and external parasites.
9. With a veterinarian's assistance, have a blood test made.

Learning activities:
1. List 15 swine diseases and parasites, giving symptoms, causes, preventions and cures.
2. Visit local veterinarian clinics and observe disease diagnosis.
3. Develop a total health program for the following areas of production: pre-breeding, gestation, farrowing, and postnatal period.
4. Veterinarian demonstrate taking blood test for Brucellosis.
5. All students diagram life cycle of roundworm.
6. Field trip to local farm to examine pigs for external parasites. Students arrange for demonstrations involving control measures.
7. Students report on how swine diseases are controlled or prevented on their home farm.

G. Housing and equipment

Competencies - students will be able to:
1. Compare advantages and disadvantages of central house and individual hut farrowing.
2. Explain the need for proper ventilation.
3. Suggest factors to consider when locating a building site.
4. Give advantages and disadvantages of confinement finishing units.
5. Compare use of farrowing pens or farrowing stalls and give advantages and disadvantages of each.
6. Determine space requirements for pigs in all stages of production.
7. Construct a sow feeding stall.
8. Construct a creep feeder.
9. Identify the various methods of swine waste handling systems, giving advantages and disadvantages of each.
10. Describe the kinds of slotted floors and their use.
11. Describe facility arrangements for pasture production, open shelter, and confinement feeding.
12. Explain the use of either catalytic or infra-red heaters or heat lamps in the farrowing house.

Learning activities:
1. Field trip to area facilities showing partial and total confinement and students evaluate each facility.
2. Survey type of buildings and equipment on home farm and/or neighbor's farm.
3. Make a chart showing optimum temperatures for various ages and weights of pigs.
4. Prepare a chart showing the space requirements of different sizes of pigs.
5. Review plans for building sow feeding stalls, and construct one.
6. Make a report on the various kinds of waste handling systems.
7. Field trip to observe waste handling systems in operation.
8. Inventory the equipment used by a successful swine producer in your local area.
9. Use tele-lecture for discussion with an ag engineer at ISU concerning housing and equipment.

10. Design a farrowing building with attached nursery.
11. Determine costs of various systems and justify choice of the system you would recommend.
12. Design and implement a combination office/health room with a list of equipment needed.
13. FFA chapter members construct creep feeders and provide this as a fund raising activity as well as community service.

H. Marketing

Competencies - students will be able to:

1. Identify the different methods of marketing hogs, giving their advantages and disadvantages.
2. Justify the economics of feeding to heavier weights.
3. Determine how hogs will get to market.
4. Evaluate the quality of hogs as to individual grades.
5. Explain the economics of marketing grade and yield.
6. Explain seasonal trends in swine marketing.
7. Identify wholesale and retail cuts of swine.
8. Describe shrinkage and its economic implication.
9. Recommend procedures to eliminate losses connected with transporting swine.
10. Construct sorting facilities for grouping market pigs.

Learning activities:

1. Take a field trip to observe a community hog buying station.
2. Interview the local hog buyer.
3. Conduct a survey to determine what weights swine in the community are marketed and the most prevalent grade placed on the hogs.
4. Make a chart showing the price fluctuation for the past five years in marketing of swine.
5. Practice evaluation of individual hogs as to market grades.
6. Chart daily market prices.
7. Use slidefilms and trip to processing plant to identify wholesale and retail cuts of swine.
8. FFA officers obtain a meat cutter to demonstrate cutting a carcass. Students calculate value of primal cuts. Discuss bruises and economic implication to the pork industry.
9. FFA chapter conduct speech contest on minimizing livestock losses related to marketing.
10. View plans of sorting and loading facilities. Discuss their use in improving swine enterprise on home farm.
11. Grade a group of market hogs.
12. Grade a group of carcasses.

I. Record keeping and analysis

Competencies - students will be able to

1. Describe important features of breeding and farrowing records.
2. Describe importance of labor and feed records.
3. Analyze complete enterprise analysis records (see Farm Business Management guide).
4. Explain the value of records in obtaining credit.
5. Recognize the data upon which production records need to be kept.

6. Select a usable ear notching system for home farm and record for later identification.

Learning activities:

1. All students use worksheets to prepare budgets for sow and litter and feeder pig enterprise.
2. Analyze home farm swine records.
3. Prepare a breeding and farrowing record book for use on home farm.
4. Study different ear notching systems, and select one for use on the home farm.
5. FFA chapter conduct a 35-day litter weight contest. Award trophy to member producing heaviest litter. Present award at parent-son banquet giving detailed report of contest.
6. FFA officer contact service clubs and be responsible for a program discussing swine record keeping. Many service clubs will be willing to recognize students with outstanding performance in record keeping.

Instructional Aids

1. Breeds of Swine - slidefilm, Illinois Vocational Agricultural Service.
2. Judging Market Hogs - slideset, University of Minnesota.
3. Swine Conformation - slideset, ISU Media Resource Center.
4. Swine Carcass Evaluation - slideset, ISU Media Resource Center.
5. How Feeding and Management Affect a Sow's Reproduction - slideset, IVATA.
6. Gestation-Lactation Period Management of Sows and Gilts - slideset, Purdue University.
7. Saving Little Pigs - film, Purdue University.
8. A New Era in Swine Production - film, Purdue University.
9. Feeder Pig and Market Hog Production - transparency masters, University of Missouri.
10. What Can a Farmer Pay for Feeder Pigs - worksheet, University of Illinois.
11. Leaner Hogs and Longer Profits, - film, Purdue University.
12. Modern Pork Production - film, Purdue University.
13. Swine Handbook - Housing and Equipment, University of Illinois
14. Brucellosis in Swine - film, Purdue University.
15. Keeping and Using Swine Records, VAS 1030; University of Illinois.
16. Curriculum Guide for Agricultural Production, North Carolina State University.
17. Instructional Materials for Vocational Agriculture, Texas A & M University.
18. Oklahoma Vocational Agriculture Education, Basic Core Curriculum I; Oklahoma State University

EVALUATION

1. Pre- and post-test
2. Student notebook - complete, accurate, neat
3. Oral reports - organization, method of presentation, application to home farm or occupational experience program.
4. Written assignments - organization, content
5. Class participation - attendance, attitude, interest

6. Visual displays completed by students.
7. Students participation in course planning - surveys, interviews, field trips, resource people.
8. Identification scores on breeds and body parts of livestock.
9. Identification scores on wholesale and retail cuts of meat.
10. Evaluation scores on grading and ranking classes of livestock (live and carcass).
11. Evaluation scores of livestock products (e.g., milk, eggs, wool).
12. Goals developed and reached relating to occupational entry in animal science.
13. Adapting approved practices on home farm in addition to student's supervised experience program.
14. Selection and preparation of feed and feed supplements for use on home farm.
15. Percentage of beef and dairy cows calving at regular 12 month intervals.
16. Percentage of sows farrowed in relation to number of sows bred.
17. Swine litter weaning weights.
18. Percentage of U.S. No. 1 pigs marketed from home farm.
19. Percentage of lamb crop raised.
20. Amount of production increase in milk and butterfat of dairy herd.
21. Number of eggs produced per hen.
22. Feed efficiency in production of broilers.
23. Selection of livestock enterprise to fit the feed, labor, facilities and capital available on home farm.
24. Proficiency displayed in following skills:
    Correct use of livestock terminology.
    Analyze feed tags.
    Analyze records of supervised farming programs.
    Evaluation of pedigrees.
    Formulating rations for various ages of animals.
    Recognize dominant and recessive traits.
    Recognize signs of parturition.
    Fitting and showing animals.
    Identification methods used on livestock.
    Castrating, docking, dehorning and foot trimming.
    Selecting and using insecticides for control of external parasites.
    Selecting and using wormers.
    Sanitation practices used on home farm.
    Identification of diseases and their control.
    Breeding livestock for desired time and intervals for birth of offspring.
    Detecting estrus.
    Determining age of sheep and horses.
    Estimating weight of livestock.
    Cull undesirable animals.
    Collect water samples and analyze results.
    Inventory livestock equipment.
    Operate milking equipment.
    Selection of fencing materials.
    Determining space requirements for livestock.
    Comparing marketing methods and outlets.
    Loading and transporting livestock.
    Handling animal waste.

REFERENCES

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Madison, Wisconsin 53702

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Agribusiness and Natural
Resource Education

Curriculum Guide

AGRONOMIC SCIENCE

A joint publication of:

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Career Education Division
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Des Moines, Iowa 50319

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SOURCE OF CURRICULUM GUIDES

The following ten curriculum guides in agribusiness and natural resources are available as a set from the Department of Public Instruction:

Agribusiness and Natural Resource Education

Animal Science

Agronomic Science

Agricultural Mechanics

Farm Business Management

Agricultural Supplies and Services

Agricultural Products Processing and Distribution

Horticulture

Agricultural Resources and Conservation

Occupational Experience in Agriculture

Order from Information and Publications Services Section, Department of Public Instruction, Grimes State Office Building, Des Moines, Iowa 50319.

Price, $5.00 per set of ten curriculum guides listed above. Please send remittance with order.

FOREWORD

This curriculum guide is one of ten developed for use by vocational and technical agribusiness instructors in planning instructional programs to meet the needs of their students. Elementary teachers and instructors in other subject matter areas at the secondary level may find the guide of value in introducing principles of career education in their instructional programs. Although much of the material is designed for use at the secondary or post-secondary levels, many of the competencies may be introduced at the awareness or exploratory levels of career education.

Instructors in multiple-man departments at the secondary level and in post-secondary schools may organize nine-week or semester courses around the units and problem areas outlined in this guide.

Appropriate competencies and learning activities have been provided for each problem area. The competencies listed are those determined in previous studies as needed by persons employed in agronomic occupations. Instructional aids and references are listed for each unit.

A list of titles of occupations requiring competencies in agronomic science has been included in the guide. It is assumed that only partial attainment of some competencies can be done at the secondary level. The competencies may not be mastered until the student has completed additional preparation at the post-secondary, young or adult class, or collegiate levels. It is assumed that "hands on" and occupational experience will be provided with class and laboratory instruction at all levels.

Evaluation of the instruction in agronomic science should be based largely upon attainment of the competencies listed in this guide, and on the application of them as students participate in occupational experience programs.

Allocations of units and of instructional time in the four-year sequence of courses at the secondary level are presented in the curriculum guide titled, Agribusiness and Natural Resource Education. Also presented are suggested activities involving agronomic science for teachers at the kindergarten through sixth grade level, and suggested outlines of subject matter to be included in exploratory programs at the junior high school level.

Curriculum Guide, Agronomic Science was prepared by George G. Cummins, Vocational Agriculture Instructor, Vinton, Iowa; Donald D. Kent, Vocational Agriculture Instructor, Eddyville, Iowa; and G. Leslie Johnson, Vocational Agriculture Instructor, Rockwell City, Iowa (Committee Chairman).

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This curriculum guide represents the best thinking of a select group of vocational agriculture teachers. It is the result of the pooling of knowledge and experience, and much research of curriculum developments in other states, by 22 men enrolled in Ag Ed 593D, Workshop in Curriculum Development in Agribusiness and Natural Resources during June 1973.

Much credit is due the members of a steering committee which met for three sessions in advance of the workshop to determine the areas to be involved and the format to be followed. The following were members of the steering committee:

State Consultant Staff in Career Education - Emeron Dettmann, Gerald Lamers and Elwood Mabon.
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OCCUPATIONAL TITLES - AGRONOMIC SCIENCE

Instructional programs based upon content in this guide will prepare individuals for job entry, will upgrade occupational skills, or will prepare the learner for further occupational preparation.

Cash Grain Farmer
Custom Farm Operator
Experimental Farm Manager
Certified Seed Producer
Fertilizer or Lime Applicator
Spray Equipment Operator
Harvesting Supervisor
Pilot - Pest Control Applicator
Farmhand
Farm Loan Assistant
Farm Record Specialist
Farm Manager
Abstractor
Hail Insurance Adjustor
Farm Realtor
PCA Manager
Farm Supply Salesman
Grain Buyer
Hay and Forage Buyer
Produce Department Manager
Chemical Salesman or Fieldman
Grain Products Salesman
Farm Fuel Supplier
Food Processing Company Employee
Fertilizer Dealer or Fieldman
Fertilizer Plant Employee
Advertising Firm Manager
Market Research Analyst
Extension Director
Extension Crops or Soils Specialist
Pathologist
Entomologist
Botanist
Vocational Agriculture Instructor
Agricultural Journalist
Agricultural Broadcaster
Auctioneer
Commodity Broker
Seed Processing Foreman
Fieldman, Food Processing Company
Packing Shed Foreman
Grain Inspector
Seed Inspector
Research Technician
Weed Control Assistant
Seed Production Manager
Weed Inspector
Truck Driver - Grain and Supplies
Feed Mill Employee
Elevator Manager
Elevator Employee
Certified Seed Field Inspector
Farm Machinery Dealer
Farm Machinery Salesman or Mechanic
Farm Equipment Fabricator
Farm Equipment Research Technician
Agricultural Engineer
Farm Machinery Company District Manager
Grain Dryer Operator
Soil Conservation Aide (Technician)
Pilot-Soil Mapping
Soil Conservationist
Soil Scientist
Park Naturalist
Park Employee
Drainage Contractor
Soil Mapper
Soil Test Lab Employee
Wildlife Conservation Officer
College Professor
Peace Corps Volunteer
County Assessor
Plant Breeder
Agricultural Missionary
Farm Newspaper Editor
Foreign Agricultural Service Employee
Agricultural Economist

AGRONOMIC SCIENCE

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GENERAL OBJECTIVES

Students completing instruction in agronomic science will have strengthened their interests in agronomic industries and have developed abilities to (1) analyze their future employment opportunities in the industries; (2) analyze the contribution of soil and crops to the economy of the local community, state and nation; and (3) to plan and manage profitable crop production enterprises.

UNITS

Agronomic Opportunities: Economic and Occupational
Soil Properties
Soil Management
Fertilizers
Plant Growth
Oat and Other Small Grain Production
Corn Production
Soybean Production
Forage Production: Hay, Pasture, and Silage
Pests of Agricultural Crops: Insects, Diseases, and Weeds

Agronomic Opportunities: Economic and Occupational

Problem Areas

A. Importance of food and fiber for daily living
B. Economic value of crops in the United States and in Iowa
C. Major crop areas of the United States and of the world
D. Major uses of land in the United States
E. Occupational opportunities in crops and soil management

Competencies and Learning Activities

A. Importance of food and fiber for daily living

Competencies - students will be able to:

1. Chart population growth trends in the world and in the United States.
2. Estimate annual per capita consumption of food and nonfood agricultural commodities.
3. Determine ways agricultural crops are used in edible and nonedible products.

Learning activities:

1. Students find information in census data and make graphs of population growth trends.
2. Chart local population trends of past 15 years.
3. Take the county plat book and count the vacant farmsteads shown in it.
4. Take a field trip to an area of the school district where several small farms have been combined into one larger unit and analyze the causes and effects.
5. Students survey of individual townships on vacant farmsteads, age of farm operators, average farm size, and off-farm employment.

6. Each student draw an individual commodity from a hat and write a detailed report on production, processing, distribution, consumption, and employment opportunities. (Could also give oral report to the class).
7. Take trip to grocery store and identify end-products made from various agronomic crops.
8. Field trip to a crop processing plant in the community.
9. Teacher will collect seeds from as many different crops as possible for students to plant and study in the classroom.
10. Students bring labels from products at home that are crop derivatives.

B. Economic value of crops in the United States and in Iowa

Competencies - students will be able to:

1. Interpret census data on the amount of crops grown in United States, Iowa, and the local county.
2. Calculate the value of crop production using census data.
3. Chart the commonly grown crops in the local community in order of economic importance.

Learning activities:

1. Using census data and current market information, the student will make charts showing the value of crops in our economy.
2. Each student will determine the total value of crops grown on the home farm, or on a typical or selected farm in the area in one cropping season.

C. Major crop areas of the United States and of the world

Competencies - students will be able to:

1. Identify the major crop producing areas of the world and of the United States.
2. Locate the leading countries and states in the production of specific crops.
3. Explain the reasons for the location of major crop production areas.

Learning activities:

1. The student will consider environmental information from various parts of the world and of the United States, and determine why various crops are grown in these areas.
2. The student will identify the major crop producing areas of the world on maps.
3. Using census data, the student will rank the leading states in the production of corn, soybeans, small grains and forages.

D. Major uses of land in the United States

Competencies - students will be able to:

1. Compile ways agricultural land has been taken out of production for nonagricultural use.
2. Estimate the percentage of the land in the United States used for various agricultural and nonagricultural purposes.
3. Explain county-wide land use management (zoning).

Learning activities:

1. Students question representatives from pro-zoning and anti-zoning groups to get opposing views on land use planning.
2. Students request a member of the local zoning commission to appear before the class and explain present zoning restrictions in effect in the local community or county.
3. A panel of students, highway commission planners, real estate developers and industrial planners could discuss the amount of agricultural land required for particular projects, such as: a highway, a factory, a shopping center, or a trailer court.
4. Students will gather and present information showing the major agricultural and nonagricultural uses of land in the United States.

E. Occupational opportunities in crops and soil management

Competencies - students will be able to:

1. Describe ten job opportunities related to agronomic science.
2. Classify job opportunities in agronomic science as to professional, skilled, semiskilled and nonskilled.
3. Locate sources of information on agronomic occupations.
4. Collect information on requirements and responsibilities concerning specific occupations in agronomic science.

Learning activities:

1. Each student will choose an occupation in the agronomic industry, review the specific references available and report his findings to the class.
2. The class will classify the occupations from the above activity as professional, skilled, semiskilled and nonskilled.
3. Students could invite employees from various industries to visit and discuss their occupations.
4. The class could take a field trip to local agronomic industries to observe different employment opportunities.
5. The student will estimate the number of people employed in the production-processing-distribution cycle.

Instructional Aids

1. Food, Famine, and Farmer Brown - movie, Farmland Industries, Inc.
2. The Land - movie, Farmland Industries, Inc.
3. Man on the Land - movie, Farmland Industries, Inc.
4. New Foods from Canadian Crops - 1973 movie, John Deere.
5. The Agricultural Story - movie, Farmland Industries, Inc.
6. The American Farmer - movie, Farmland Industries, Inc.
7. Dynamic Careers through Agriculture - movie, Farmland Industries
8. Rewarding Careers in a Dynamic Industry - Agriculture - movie, Cargill, Inc.
9. Famine Fighters - Careers in Production Agriculture - 1972 Slides, tape, brochure, Illinois Vocational Agriculture Service.
10. $130 Billion Food Assembly Line - filmstrip or slideset and cassette, No. C187, U.S. Department of Agriculture.
11. The Peaceful Revolutionists - filmstrip or slideset and cassette, No. C191, U.S. Department of Agriculture.
12. Miracle in the Supermarket - filmstrip, narration, teacher guide, Illinois Vocational Agriculture Service.
13. Opportunities in Agriculture Kit - filmstrip, narration, teacher guide, Illinois Vocational Agriculture Service.

14. Careers in Crops - filmstrip, taped narration, illustrated script, #182-1, Vocational Education Productions.
15. Learning Activity Pac-Agriculture-The World of Work - Wisconsin Department of Public Instruction.
16. Planning for the Supervised Occupational Experience Program - transparencies, Clemson University.
17. Careers in Agriculture - transparencies, IVATA, 1966.
18. Iowa Conservation Needs Inventory 1970 - transparencies and charts, county SCS office.

Soil Properties

Problem Areas
- A. Soil formation
- B. Physical properties of soil
- C. Chemical properties of soil

Competencies and Learning Activities

A. Soil formation

Competencies - students will be able to:
1. Describe soil and terms associated with soil.
2. Explain the five major factors responsible for soil formation.
3. Distinguish between chemical and physical weathering.
4. Identify the major soil associations within the state and explain how they were developed.
5. Differentiate between the various transported soils: glacial, loessial, colluvial, alluvial.
6. Recognize the difference between igneous, metamorphic, and sedimentary rock formations.
7. Compare the effect of prairie and forest vegetation on soil formation.

Learning activities:
1. Have students arrange for a member of the county historical society to briefly describe past geological development of the area.
2. Students visit road cuts, gravel pits, strip mines and other such areas to observe soil formation characteristics.
3. Students collect samples of igneous, metamorphic and sedimentary rocks and discuss the types of soils that are formed from them.
4. Students take soil probes in forest, prairie and transitional soils.
5. Students will collect samples of different kinds of transported soils and identify the method by which they were moved.
6. Students visit with Soil Conservation Service personnel to discuss area soil formation.
7. Students visit a stream to observe soil translocation and sedimentation.

B. Physical properties of soil

Competencies - students will be able to:
1. Label a drawing showing the different layers of a soil profile.

2. Draw a circle graph showing the composition of average soil.
3. Distinguish between soil structure and texture.
4. Determine the soil texture name using both the texture triangle and the mudball-ribbon methods.
5. Identify five kinds of soil structure.
6. Match soil colors with identifying characteristics.
7. Determine percent slope, degree of erosion, soil depth, and permeability.
8. Read a soil survey map and determine the types of soil found in the school district.
9. Determine organic matter content of a soil sample.
10. Explain water movement and retention in soil.

Learning activities:

1. Visit an overflow area near a stream to observe the physical characteristics of soil.
2. Visit a road cut of a tile trench to observe the soil profile.
3. Make representative profiles of the different soil types in the local soil association area.
4. Students bring in soil samples from home and place into the proper textural classifications using the mudball-ribbon method.
5. Students make mud pies to observe the effect of puddling on soil structure and then plant seeds to observe emergence.
6. Check permanent fencerows and nearby cultivated fields to compare the physical properties and the soil losses.
7. Use handlevels to determine percent slope on eroded soils and then compare the depth of the topsoil with that of nearly level soils.
8. Locate and bring to class examples of different kinds of soil structures.
9. Observe different colored topsoils and subsoils, and determine the factors causing the color formation.
10. Study a soil map of a selected farm in the classroom and then go out to observe the farm.
11. Collect samples of soils that have different levels of organic matter, place the samples in jars of water and shake, allow to settle overnight, and then observe organic matter content and soil particle size.
12. Students build partitions in an aquarium, fill each section with a different textured soil, slowly add water to the top of each soil and observe water movement.
13. Students set up an experiment using different diameter glass tubes set in a pan of water to observe capillary water action.

C. Chemical properties of soil

Competencies - students will be able to:

1. Identify the 16 essential elements for plant growth.
2. Explain the cation exchange theory.
3. Determine pH level of a soil sample.
4. Identify soil cations and anions and discuss their interactions in the soil.
5. Classify essential soil elements as either major nutrients, secondary nutrients, or micro-nutrients.
6. Explain the relationship of liming and soil nutrient release and uptake.

7. Explain the relationship of moisture in the soil and chemical release.
8. Explain ammonification, nitrification, and denitrification reactions.

Learning activities:

1. Students test calcareous and noncalcareous soils to determine the pH levels.
2. Draw a particle of soil showing the chemical symbols and ion charges for both cations and anions.
3. Diagram the nitrogen cycle and explain the chemical reactions that occur.
4. Each student draw one of the 16 essential elements from a hat, research that element, write a report and make a presentation to the class.

Instructional Aids (See Page 38)

Soil Management

Problem Areas

A. Soil capability classification and soil judging
B. Soil testing
C. Soil conservation (see Agricultural Resources and Conservation Guide)

Competencies and Learning Activities

A. Soil capability classification and soil judging.

Competencies - students will be able to:

1. Classify soil areas into the proper capability classifications using the standards set up by the United States Department of Agriculture.
2. Set up land use programs according to capability classifications.
3. Determine the limiting factors that cause land to be put into a class other than Class I.
4. Interpret soil maps that have been developed for the home farm or a specific farm selected for class use.
5. Judge soils using the Iowa Soil Judging Scorecard.
6. Locate the different land capability classes on a given farm.

Learning activities:

1. Study the state soil judging scorecard section on soil capability classification.
2. Enter a soil judging contest above the local level.
3. Visit a site that has most of the different soil capability classes and have the students draw in the land classes on an aerial map of the property (color map when they return to the classroom).
4. Accompany a Soil Conservation Service technician to a farm and participate in a soil mapping exercise.
5. Study the most recent soil survey of the county to locate the different soil capability classes.
6. On a selected farm have the students identify the limiting factors that prevent a soil from being rated Class I.

B. Soil testing

Competencies - students will be able to:
1. Take a representative soil sample.
2. Properly fill out a soil sample information sheet.
3. Interpret soil test reports and make fertility recommendations.
4. Detect soil nutrient deficiencies with a portable test kit.
5. Interpret soil survey information and determine crop suitability ratings.
6. Explain the purpose of Soil Conservancy Districts.
7. Compute soil loss using conservancy law standards.
8. Determine if a soil sample is acid, neutral, or alkaline using a pH scale.
9. Calculate the amount of lime required to convert soil pH.
10. Describe the calcium carbonate equivalent of various liming materials.
11. Identify soil areas to avoid or sample separately.

Learning activities:
1. Field trip to the home farm of one of the students to get a representative soil sample, a summary of the cropping history, a soil sample map, and to complete other sections on the information sheet.
2. Students take soil samples on their home farms, prepare the samples for mailing, complete the information sheet and send the samples to a soil testing laboratory (test results to be used later in the Fertilizer Unit and the Crops Units).
3. Students use portable soil test kits to check soil samples for pH levels and for nutrient deficiencies.
4. Compile an address list of approved soil testing laboratories.
5. Study the soil test reports and make adjustments for past crops, manure applied, carryover and management level; and determine fertilizer rate recommendations.
6. Students compare soil survey fertility information from the Soil Conservation Service to the actual soil test reports.
7. Use the acid bottle test to observe the effervescence of calcareous soils.
8. Run the sieve test on liming materials, get a test on the calcium carbonate level, and calculate the calcium carbonate equivalent.
9. Using the above sample of liming material determine the rate of lime needed per acre to raise the pH level one point on a given soil sample.
10. Take a pH reading on different soils and use the pH scale to determine whether the soils are acid, alkaline, or neutral.
11. Identify the soil conservancy districts on a map of Iowa and determine to which district a farm belongs.
12. Identify the soil district commissioners from the local district.
13. Interpret the content of the Iowa Soil Conservancy Law.
14. Using Soil Conservation Service soil loss formulas, compute the soil loss per acre on a given farm, and recommend practices which will reduce soil losses below maximum allowable limits.

C. Soil conservation (see Agricultural Resources and Conservation Guide)

Instructional Aids

1. Mulch Tillage: Erosion Problem Solver--movie, John Deere.
2. Conserving Our Soil Today--movie, Farmland or Illinois VAS.
3. Raindrops and Soil Erosion--movie, Farmland.
4. Look to the Land--movie, Illinois VAS.
5. Man Makes a Desert--movie, Illinois VAS.
6. Rape of the Earth--movie, Illinois VAS.
7. Soil Bin Study of Dynamics of Tillage--movie, Illinois VAS.
8. Soil Conservation with Regular Farm Equipment--movie, Illinois VAS.
9. Drain Your Way to Profits--movie, ISU Media Center.
10. Found-Lost Acres By Tile Drainage--movie, ISU Media Center.
11. The Land--movie, ISU Media Center.
12. Land of Plenty--movie, ISU Media Center.
13. More from Less: Progress Report on No-Tillage--movie, ISU Media Center.
14. Agriculture and the Environment--filmstrip and cassette, Illinois VAS.
15. No-till Row Crop Production for Soil Conservation--slideset and script, University of Missouri Instructional Materials Laboratory.
16. Our Soil Resources--transparencies, catalog #352, unit #2, 3M Co.
17. The Land that Supports Us--transparencies, catalog #351, unit #1, 3M Company.
18. Land Classification for Best Use--worksheet, FM-6502, University of Missouri Instructional Materials Laboratory.
19. Soil Treatment and Use--worksheet, BF-5503, University of Missouri Instructional Materials Laboratory.
20. Cropping Systems--worksheet, FM-6504, University of Missouri Instructional Materials Laboratory.
21. Record of Fertilizer--worksheet, FM-3, University of Missouri Instructional Materials Laboratory.
22. Land Measuring Wheel, #C11N-W25F, NASCO.

Fertilizers

Problem Areas

A. Types of fertilizers: organic and inorganic
B. Selection of fertilizers
C. Application of fertilizers (see Agricultural Mechanics Guide)
D. Fertilizer handling safety (see Agricultural Mechanics Guide)

Competencies and Learning Activities

A. Types of fertilizers: organic and inorganic

Competencies - students will be able to:

1. Identify the nutrients commonly deficient in soil.
2. Distinguish between three organic methods of increasing soil fertility.
3. Estimate the fertilizer value of green manure, livestock manure, and legume crops harvested.
4. Distinguish between gas, liquid and solid forms of fertilizer.
5. Identify the equipment needed to handle various forms of fertilizer.
6. Describe the relative advantages of various nutrient sources.
7. Explain the solubility and movement in the soil of nitrogen, phosphorous and potassium.

Learning activites:

1. Students review their notes on the soil testing unit to refresh their knowledge of common soil nutrient deficiencies.
2. Students develop a test plot using different types of commercial fertilizers, livestock manures and green manures.
3. Students gather experimental data on the comparative advantages of commercial fertilizers, manure and green manure as sources of soil nutrients.
4. Visit a fertilizer supplier to observe different forms of commercial fertilizer and see the equipment needed to handle these fertilizers.
5. Students work in committees to gather information concerning fertilizer sources: raw materials, manufacturing processes, transportation and storage, special equipment needed, relative cost, methods of application, product availability and safety.
6. Place samples of fertilizers in jars of water and observe rate of dissolving and solubility.

B. Selection of fertilizers

Competencies - students will be able to:

1. Match fertilizer analysis data with readily available fertilizer materials.
2. Explain the chemical and physical reactions of fertilizers in the soil.
3. Convert P_2O_5 and K_2O from the oxide form to the elemental form.
4. Compute fertilizer cost per pound of nutrient from different available sources.
5. Determine best fertilizer source based on time and method of application.
6. Determine fertilizer requirements based on soil test recommendations.
7. Substitute one grade analysis of fertilizer for another grade analysis to get the desired nutrients required.

Learning activities:

1. Survey local fertilizer dealers to determine the available fertilizer sources, the grade analysis, and the cost.
2. Compute nutrient requirements from the soil test report on the home farm situation (taken during Soil Testing Unit).
3. Select the fertilizer materials needed to correct the nutrient deficiencies on the home farm.
4. Using the cost of fertilizers obtained in the above survey, figure the most economical combination of fertilizer materials to meet the nutrient needs on the home farm.
5. Match the sources of fertilizers to the time and method of application available on the home farm.

C. Application of fertilizers (see Agricultural Mechanics Guide)

Competencies - students will be able to:

1. Identify common dry, liquid and gas fertilizers.
2. Describe optimum fertilizer placement.
3. Identify commonly used fertilizer application equipment.
4. Select the most efficient method of application dependent upon time and rate.
5. Develop a complete farm fertilization program.
6. Determine the most economical method of applying micro-nutrients.

Learning activities:

1. Students determine the average number of days in the fall and in the spring that are available for fertilizer application.
2. Student obtain research data comparing fertilizers applied in the fall, in the spring pre-plant, or post-plant.
3. Students experiment with fertilizer placement as related to seed germination using soil flats in the classroom.
4. Conduct test plots with various levels of fertilizer application rates.
5. Students take a field trip to observe the different equipment used in applying various types of fertilizer.
6. Students obtain information on the methods and the costs of applying micro-nutrients on deficient soils.
7. Students compare the cost of custom application of fertilizers to the cost of owning and operating fertilizer equipment.
8. Invite fertilizer salesman to explain the effect of temperature, organic matter, and micro-organisms on fertilizer selection and placement.

D. Fertilizer handling safety (See Agricultural Mechanics Guide)

Competencies - students will be able to:

1. Explain considerations in handling and storing fertilizer nutrients: pressure, corrosion and transportation.
2. Design handling systems for maximum labor efficiency.
3. Identify safety hazards in using fertilizers.
4. Comply with Occupational Safety and Health Act (OSHA) requirements for fertilizer use.
5. Administrate first-aid treatment to victims of fertilizer accidents.

Learning activities:

1. Students take a field trip to a local fertilizer dealer and observe the methods used in storing different types of fertilizers.
2. Students observe fertilizers being handled and applied and list all situations which would be classified as safety hazards.
3. Students study the safety requirements which apply to fertilizer handling and storage that are outlined in the Occupational Safety and Health Act.
4. Students check with local fire departments and rescue units to determine what procedures should be used in the event of fertilizer accidents.

Instructional Aids

1. Custom Blends--movie, Chevron Chemical Company.
2. Blessings From the Sea--movie, Farmland.
3. Bread From Stone--movie, Farmland.
4. Flight to Florida--movie, Farmland.
5. Sparkplugs of Plant Nutrition--movie, Farmland.
6. What's in the Bag?--movie, Farmland.
7. Anhydrous Ammonia and Your Safety--movie, ISU Media Center.
8. Pay Dirt--movie, ISU Media Center.
9. Plant Nutrients in the Environment--filmstrip and script, Illinois VAS.

10. Fertilizers: A Paying Investment--filmstrip and script, Fertilizer Institute.
11. Life of the Green Plant--filmstrip and script, Fertilizer Institute.
12. Nutrient Deficiency Symptoms in Plants--individual slides to select, Fertilizer Institute.
13. Anhydrous Ammonia--series of slidesets, Fertilizer Institute.
14. Nitrogen Reactions in the Soil--transparencies, Farmland
15. How Soil pH Affects Availability of Plant Food--poster, Fertilizer Institute.
16. Fertilizer Kit--samples, #LS518P, NASCO.

Plant Growth

Problem Areas

A. Plant types
B. Germination and emergence
C. Propagation and improvement
D. Photosynthesis, respiration and transpiration

Competencies and Learning Activities

A. Plant types

Competencies - students will be able to:

1. Identify four terms used in plant identification when designating species of plants.
2. Explain the functions of various parts of a plant.
3. Compare plant systems, roots, flowering and foliage.
4. Distinguish between annuals, perennials, and biennials.
5. Distinguish between grasses and legumes.

Learning activities:

1. Label the parts of a plant on a drawing.
2. Bring to class specimens of the four plant classes.
3. Prepare a collection of plants showing the different plant systems including roots, flowers, and foliage.
4. Dissect roots, flowers, stems and leaves; and discuss the specific functions of the identifiable parts.
5. Discuss five grasses and five legumes that are of major economic importance in Iowa.
6. Perform laboratory experiments which show the functions of various plant parts (remove leaves, prune roots, emasculate flowers).

B. Germination and emergence

Competencies - students will be able to:

1. Recognize the stages of seed germination and emergence.
2. Operate a seed germination tester and calculate the test results.
3. Explain good seed germination and emergence requirements.

Learning activites:

1. Students bring seed samples to class, place in germinator and calculate the results.
2. Identify the seeds in a grain sample that are unlikely to germinate and explain why they probably are not viable.

3. Visit a seed testing laboratory to observe the effects of scarification and vernalization.
4. Germinate various seeds and record the stages of germination and emergence.
5. Plant seeds at different depths to determine the effect on emergence.
6. Run experiments in the classroom to observe the effect of temperature and moisture on seed germination and seedling emergence.

C. Propagation and improvement

Competencies - students will be able to:
1. Recognize various methods of vegetative reproduction.
2. Diagram the life cycle of a flowering plant.
3. Compare self-pollination with cross-pollination.
4. Explain procedures used in developing new plant varieties.
5. Certify seed according to Iowa Crop Improvement Association standards.
6. Diagram the field layout for producing inbred, single cross, three-way cross, and double-cross hybrids.
7. Explain male sterility and its use by plant breeders.
8. Explain the effect of cytoplasm on plant breeding techniques.

Learning activities:
1. Review mitosis and meiosis (see Animal Science Guide)
2. Bring to class a selection of plants which propagate by various methods.
3. Plan a field trip to a hybrid seed corn production plant to see how hybrid crosses are developed.
4. Develop a seed production plan, produce the seed and sell certified seed.
5. Trip to an agricultural experiment station to observe plant breeding processes.
6. Invite a plant breeder to discuss the development of new plant varieties.

D. Photosynthesis, respiration and transpiration

Competencies - students will be able to:
1. Distinguish between photosynthesis, respiration, and transpiration.
2. Diagram the respiration cycle.
3. Explain the steps of photosynthesis.
4. Describe plant nutrient uptake.

Learning activities:
1. Conduct experiments in the classroom on photosynthesis by controlling temperature, moisture and light.
2. Conduct experiments in the classroom on respiration using plastic covers and controlled air movement.
3. Conduct experiments in the classroom on transpiration using food coloring in the water.
4. Experiment with commercial experiment kits showing the importance of chlorophyll in plants.
5. Diagram the photosynthesis process explaining the chemical and physical reactions that occur in each step.

Instructional Aids

1. Making the Most of a Miracle--movie, Farmland.
2. The National Arboretum--movie, Illinois VAS.
3. How Grass Grows--movie, ISU Media Center.
4. Miracles from Agriculture--movie, ISU Media Center.
5. Seeds of Plenty--movie, ISU Media Center.
6. Seed Germination--movie, ISU Media Center.
7. Weeds of North Central States--slideset and script, University of Missouri Instructional Materials Laboratory.
8. Exhibiting Plant Products at the Fair--filmstrip and script, #114-1, California VEP.
9. Plant Identification: Annuals, Perennials, House Plants--filmstrip, tape and script, #150-1, California VEP.
10. Morphology of Grasses--transparencies, #168-1, California VEP.
11. Production Agriculture: Animal, Soil and Plant Science--transparencies, #1503, Texas A & M University.
12. Our Plant Resources--transparencies, Conservation Unit #4, 3M Co.
13. Plant Science--transparencies, Vo-Ag Core Curriculum III, Oklahoma State Department.
14. Field Crops Identification--scorecards, #10, University of Missouri Instructional Materials Laboratory.
15. Hay Judging--scorecards, #12, University of Missouri Instructional Materials Laboratory.
16. Seed Judging--scorecards, #11, University of Missouri Instructional Materials Laboratory.
17. Parts of a Complete Flower--Worksheet, #88-89, University of Missouri Instructional Materials Laboratory.
18. Determining the Rate of Planting Corn--Worksheet, #151, University of Missouri Instructional Materials Laboratory.
19. Crop Budget--Worksheet, #3, University of Missouri Instructional Materials Laboratory.

Oat and Other Small Grain Production

Problem Areas

A. Introduction to oats and other small grain
B. Seed selection
C. Seedbed preparation
D. Planting: methods and practices
E. Fertilizers: rates and application
F. Pests: weeds, insects and diseases
G. Harvesting and storing
H. Marketing (see Agricultural Products Processing and Distribution Guide)
I. Production economics

Competencies and Learning Activities

A. Introduction to oats and other small grain

Competencies - students will be able to:

1. Interpret the trends of small grain production in Iowa.
2. Recognize the advantages and disadvantages of small grain production.
3. Identify the specialized uses of oats, barley, wheat, multigrain, rye, triticale, grain sorghum and other small grain.

4. Select the correct type of small grain for a given farm situation.
5. Recognize the importance of small grains in daily living.
6. Identify occupational opportunities related to small grain production.

Learning activities:

1. Analyze the home farm for small grain production opportunities.
2. Chart the small grain acreage trends in the county and in the state.
3. Develop a crop rotation that includes small grains.
4. Visit area producers of various small grains.
5. Students should refer to their notes on the importance and uses of small grain (Unit on "Agronomic Opportunities: Economic and Occupational").
6. Compare the feeding value and palatability of small grains in livestock rations.

B. Seed selection

Competencies - students will be able to:

1. Identify the parts of small grain seeds and explain the functions of each part.
2. Calculate the price per pound of pure live seed.
3. Quote the Iowa Seed Law.
4. Read and evaluate a seed tag.
5. Recognize the requirements for seed certification.
6. Operate a seed germinator.
7. Clean and treat seed for planting and/or sale.
8. Adjust seeding rates depending on the quality of the lot selected.
9. Evaluate and select seed depending on the quality of the lot selected.

Learning activities:

1. Pass out small grain seeds to students and have them separate and identify the parts of the seeds.
2. Study various small grains and their parts under a magnifying glass and a microscope.
3. Give each student a different seed tag from the same type of small grain, take a vote on which lot to purchase, and then have students calculate the cost per pound of pure live seed for each tag to find out if the majority of the students selected the best lot of seed.
4. Students judge several classes of small grains.

C. Seedbed preparation

Competencies - students will be able to:

1. Compare different depths of planting for various small grains.
2. Recognize tillage equipment to be used in seedbed preparation.
3. Analyze the comparative costs of different production methods.
4. Identify the characteristics of a good seedbed.
5. Prepare a good seedbed.

Learning activities:

1. Students conduct test plots with various methods of seedbed preparation.

2. Students conduct experiments in laboratory with soil in flats representing different methods of seedbed preparation.
3. Students tour several farms to observe different seedbed preparation methods.
4. Students contact outlying experimental farms for any test data that they might have on seedbed preparations.
5. Students prepare seedbed on home or other farm.

D. Planting: methods and practices

Competencies - students will be able to:

1. Compare drilling to broadcast seeding.
2. Identify the types of planting equipment.
3. Explain the value of seeding early.
4. Recommend the proper seeding rate and adjust that rate for seed quality.
5. Calibrate seeding equipment.
6. Select planting mixtures of small grains to be used as a nurse crop.
7. Seed small grain.

Learning activities:

1. Have students check with retired farmers in the community to learn the "rule of thumb" methods used in seeding small grain.
2. Evaluate yield test results showing differences in planting dates, planting depths, planting methods, and planting rates.
3. Students visit a farm to determine germination, emergence and the amount of tillering.
4. Provide demonstration and give students experience in seeding on school or home farm.

E. Fertilizers: rates and application

Competencies - students will be able to:

1. Identify nutrient deficiency symptoms in small grains.
2. Develop a fertilization program for small grains and the subsequent forage crop.
3. Recognize the value of fertilizer in the yield of grain and straw.
4. Describe the nutrient requirements for small grains.
5. Recognize the effect of fertilizer rates on tillering and lodging.
6. Make fertilizer application to small grains.

Learning activities:

1. Develop a small grains fertilizer program for a specific farm situation.
2. Interpret a soil test report for small grain production.
3. Fertilize a small grains test plot to show differences in yield, straw production, lodging and tillering.
4. Apply fertilizer on home farm.

F. Pests: weeds, insects and diseases

Competencies - students will be able to:

1. Identify insect and disease pests responsible for significant economic loss in small grain production.

2. Recommend cultural and chemical practices for broadleaf and grassy weeds control in small grains.
3. Recommend cultural and chemical practices for insect and disease control in small grains.
4. Control pests of small grains on home farm or on school land laboratory.

Learning activities:

1. Each student bring 10 problem weeds from small grain fields, identify them, and make recommendations for their control.
2. Using a collection net, randomly collect field samples of insects present in small grains and identify them.
3. Apply seed treatments to small grains before planting.
4. Identify disease and insect damage in small grains.
5. Trace the life cycles of the rusts of small grain including the intermediate host involved.
6. Trace the life cycle of diseases which affect small grain used as animal feed, such as prussic acid poisoning and ergot.

G. Harvesting and storing

Competencies - students will be able to:

1. Recognize the relative advantages and disadvantages of harvesting small grains as silage, high moisture grain or dry grain.
2. Compare windrow harvesting to harvesting the grain standing.
3. Determine the moisture content of harvested grain.
4. Identify the proper stage of grain development for optimum silage production.
5. Measure harvesting losses and determine the necessary machine adjustments.
6. Identify the steps in quality silage production.
7. Discuss the storage facilities needed for various harvesting methods.
8. Select a harvesting and storage system based on efficiency and economy.

Learning activities:

1. Students check grain bins at home and bring in samples of grain which spoiled in storage (determine the cause of spoilage).
2. Survey the community to determine the percentage of operators who harvest their small grain standing and determine the reasons.
3. Run moisture tests on samples of small grains.
4. Send samples of harvested grain to a laboratory for feed value analysis and compare the results with the method of harvest, the type of storage, the length of storage and the kind of grain.
5. Measure harvesting losses in the field and determine the source of loss.
6. Calculate the costs and returns in storing small grain and compare with the returns from selling the grain at harvest.

H. Marketing (see *Agricultural Products Processing and Distribution* Guide)

Competencies - students will be able to:

1. Market small grains to the best advantage.
2. Determine market grade requirements for various small grains.

3. Locate market outlets for small grains.
4. Explain influence of supply and demand on price of small grains.
5. Discount the price of small grains for test weight, moisture, and damage.
6. Calculate grain shrinkage.
7. Select the months when it would be most profitable to market various small grains.
8. Collect and interpret grain market information.
9. Identify several sources of market information.
10. Explain where and how local market prices are set.

Learning activities:

1. Students go to local elevator to: obtain grain standard charts; observe grain being checked for test weight, moisture, and damage; and observe the determination and posting of local market prices.
2. Students compile a list of market outlets available for various kinds of small grain.
3. Students chart seasonal price trends and monthly storage costs to determine the optimum time of marketing.
4. Student chart the seasonal demands of small grains.
5. Student use both the grain shrinkage charts and the grain shrinkage formulas to determine the estimated shrink in small grains.
6. Students study different sources of information on marketing opportunities.

I. Production economics

Competencies - students will be able to:

1. Calculate various efficiency factors in producing small grains.
2. Budget the annual costs and returns for various small grains.
3. Keep and analyze production records for the various small grains.
4. Set realistic goals for a grain production enterprise.

Learning activities:

1. Using a sample set of crop records, the students will figure the costs and returns for various small grains and forages.
2. Students study outlook information on planting intentions, weather, prices, domestic use and foreign use to determine profit potential in producing specific small grains.
3. Student select a small grain, gather outlook information on it and report to the class.
4. Students use a set of small grain production records and calculate total cost per bushel, machine costs per acre, labor costs, yield per acre and return per hundred dollars invested.
5. Students develop cash flow estimates for various small grains.
6. Students experiment with representative plots of common and uncommon small grains in the land laboratory.

Instructional Aids

1. Acres of Sorghum--movie, DeKalb Agricultural Research, Inc.
2. The Story of Oats and Oatmeal--movie, ISU Media Center.
3. Seed Production of Corn, Soybeans and Small Grain--filmstrip and script, Ohio State University.
4. How to Make Money Fertilizing Oats--slides or transparencies, Quaker Oats.
5. Cereal Grains--transparencies, #OT251P, NASCO.
6. Seed Germinator, #Z2448N, NASCO.

Corn Production

Problem Areas

A. Opportunities in corn production
B. Seed selection
C. Seedbed preparation
D. Planting methods and practices
E. Fertilizers: rates and application
F. Pests: weeds, insects and diseases
G. Harvesting and storing
H. Marketing
I. Production Economics

Competencies and Learning Activities

A. Opportunities in corn production

Competencies - students will be able to:

1. Interpret the trends of corn production in Iowa.
2. Recognize the advantages and disadvantages of corn production.
3. Identify the special commercial and industrial uses of corn.
4. Recognize the importance of corn production in daily living.
5. Identify occupational opportunities related to corn production.

Learning activities:

1. Analyze the home farm for corn production opportunities.
2. Chart corn acreage trends in the country and in the state.
3. Develop a crop rotation plan around corn production.
4. Students refer to their notes on the importance and uses of corn. (see unit on "Agronomic Opportunities: Economic and Occupational")
5. Compare the feeding value of corn to the other kinds of concentrates and roughages.

B. Seed selection

Competencies - students will be able to:

1. Identify the parts of the corn kernel and discuss the functions of each part.
2. Read and evaluate the tag on a bag of seed corn.
3. Interpret planting charts on the seed corn bag to establish proper planter plate selection.
4. Determine where on the corn ear the different size seeds were obtained: small rounds, flats, large rounds and culls.
5. Calculate the number of bushels (units) of seed corn needed to plant a fixed number of acres at various population levels.
6. Determine the length of maturity of various hybrids sold by an individual seed corn company.
7. Select the desired seed corn considering maturity, harvestability, disease resistance, lodging resistance, insect resistance, and yield level.
8. Identify the materials used to treat seed corn and explain the purpose of treatment.

Learning activities:

1. Take a trip to a seed corn plant to observe the processing of seed corn: cleaning, grading, sizing and bagging.

2. Each student study the planter plate chart on a different seed bag and select the appropriate plates to use when given a number of different corn planters.
3. Evaluate the test plot results on various seed corn hybrids: lodging, preharvest loss, drydown rate, and yield response.
4. Students dissect and identify the parts of the corn seed (include physiological black layer).
5. Pass out a variety of seed corn sizes and have students explain where on the ear the kernels were located.
6. Discuss the effect of seed kernel size on the germination, emergence, and yield potential.
7. Students select the best ear of corn from home, shell it and grade the kernels.

C. Seedbed preparation

Competencies - students will be able to:
1. Identify the characteristics of a good seedbed.
2. Recognize the tillage systems used in seedbed preparation.
3. Recognize the opportunities of combining pest control and fertilizer application with seedbed preparation.
4. Compare the relative advantages of minimum and conventional tillage systems.
5. Prepare desirable seedbed for corn.

Learning activities:
1. Observe various methods of seedbed preparation being used in the community.
2. Operate a test plot showing the effect of tillage systems on emergence, weed control, yield and production costs.
3. Evaluate test plot results of tillage systems on different types of soil.
4. Estimate the number of working days available in the fall and in the spring for seedbed preparation.
5. Students contact outlying experimental farms and seed companies for any test data thay they might have on seedbed preparation.
6. Evaluate erosion control and disease and insect problems due to seedbed preparation methods.

D. Planting methods and practices

Competencies - students will be able to:
1. Identify types of planting equipment.
2. Compare drill, hilldrop and check planting.
3. Calculate the actual seeding rate per acre based on desired final plant population and estimated mortality rate.
4. Calendarize the home farm corn acreage.
5. Describe the effect of planting date, row spacing and plant population on yield.
6. Explain the opportunities of combining pest control and fertilizer application with planting operations.
7. Plant corn.

Learning activities:
1. Observe various planting methods being used by farmers in the community.

2. Evaluate test plot results showing the effect of differences in in planting dates, planting rates, row widths and planting methods.
3. Operate a test plot showing the effect of planting dates, planting rates, row widths and planting methods.
4. Calendarize the crop acreage on the home farm.
5. Compare planting equipment available from local machinery dealers.
6. Calculate seed needed to plant home farm acreage.
7. Calculate actual seeding rate per acre needed to achieve desired harvest plant population.
8. Determine the actual planting rate and recommend the machine adjustments needed to achieve the desired seed population.

E. Fertilizers: rates and application

Competencies - students will be able to:
1. Identify nutrient deficiency symptoms in corn.
2. Describe the nutrient requirements for corn.
3. Recognize the effect of nutrient levels and fertilizer placement on yield and quality of corn.
4. Develop a farm fertilization program for corn.
5. Determine fertilization rates required for maximum yield or maximum return per fertilizer dollar.
6. Describe the different methods of fertilizer application for corn.
7. Apply fertilizer.

Learning activities:
1. Develop a fertilizer program to include proper application rates and application methods for a specific farm situation.
2. Interpret soil test results and determine production goals for corn production.
3. Operate a test plot showing the effect of different fertilizer rates.
4. Evaluate test plot results showing the effect of different nutrient levels, fertilization rates and fertilizer placement.
5. Observe different methods of fertilizer application being used by farmers in the community.
6. Compare fertilizer application equipment available from local machinery dealers.
7. Calculate the fertilizer application rates per acre and suggest application adjustments required.

F. Pests: weeds, insects, and diseases

Competencies - students will be able to:
1. Identify the major corn pests.
2. Select cultural and chemical control practices for corn pests.
3. Identify pest damage on corn.
4. Estimate the economic loss due to reduced yield, increased harvesting loss or reduced quality that can be attributed to corn pests (see unit on "Pests of Agricultural Crops: Insects, Diseases, Weeds").
5. Control weeds, insects and diseases of corn on home enterprise.

Learning activities:
1. Develop a pest control program for corn on a farm utilizing cultural and chemical methods.

2. Students will review available survey information to determine the progress of inherited pest resistance in corn varieties (leaf blights).
3. Calculate the economic loss per acre due to insufficient pest control.
4. Trace the life cycle of the corn borer and rootworm and determine the best method and time of control.
5. Student observe pest damage to corn and determine whether it is feasible to apply control.
6. Field trips to observe damaged fields.
7. Field trips to observe treatment methods.

G. Harvesting and storing (see Agricultural Mechanics Guide)

Competencies - students will be able to:

1. Determine harvesting losses of corn and make the necessary machine adjustments.
2. Determine the stages of maturity for corn and the proper time of harvesting for silage and for grains.
3. Determine the moisture content of harvested grain.
4. Discuss the storage facilities and equipment needed for various methods of corn harvest.
5. Select a harvesting and storage system for corn based on efficiency and economy.
6. Calculate the volume of a structure needed to store a certain number of bushels of corn.
7. Treat stored corn for pest control.
8. Properly harvest corn.

Learning activities:

1. Students bring in samples of damaged corn from the home farm storage facilities and determine the causes of damage.
2. Run moisture tests on samples of corn.
3. Send corn sample to a laboratory for feed value analysis and compare the results to the method of harvest, type of storage and length of storage.
4. Calculate the costs and returns of storing corn and compare with the return from selling the grain at harvest.
5. Compute the various harvesting losses involved with picking and combining corn and discuss the possible alternatives available to reduce these losses.
6. Visit an outstanding or unique grain handling and storage facility in the community.
7. Identify and discuss various methods of drying grain.
8. Students measure different shaped storage structures and estimate the number of bushels of dried corn the facilities will hold (cribs and granaries).
9. Students take grain probes in stored grain and analyze the grain quality.
10. Consider the feasibility of converting corn cribs for shelled corn storage.
11. Students follow various harvesting equipment and check ear and shelled corn losses.

H. Marketing (see Farm Business Management Guide)

Competencies - students will be able to:
1. Market corn to the best advantage.
2. Locate market outlets for corn.
3. Determine market grade requirements for corn.
4. Discount the price of corn for test weight, moisture and damage.
5. Calculate corn shrinkage.
6. Collect and interpret corn market information.
7. Identify several sources of corn market information.
8. Explain how and where local corn prices are set.
9. Select the month when it would be most profitable to market corn.
10. Discuss the supply and the demand for corn.

Learning activities:
1. Visit local elevator to: obtain corn grade standard charts; observe corn being checked for test weight, moisture and damage; and observe the determination and posting of local corn prices.
2. Compile a list of market outlets available for corn.
3. Chart seasonal price trends of corn and the monthly storage costs to determine the optimum time of marketing corn.
4. Use both the corn shrinkage charts and the corn shrinkage formulas to determine the estimated shrink in corn.
5. Study the different sources of information on corn marketing opportunities.

I. Production economics

Competencies - students will be able to:
1. Calculate various efficiency factors in corn production.
2. Budget the annual cost and returns in corn production.
3. Keep and analyze production records for corn.
4. Set realistic goals for a corn production enterprise.
5. Analyze the economic features of various cultivation practices used in corn production.

Learning activities:
1. Using a sample set of crop records, the students will determine the costs and returns involved in corn production.
2. Study outlook information on planting intentions, weather, prices, domestic and foreign demand to determine the profit potential in producing corn.
3. Students gather outlook information on corn, report to the class and compare management decisions.
4. Using a set of corn production records the students figure: total cost per bushel, machine costs per acre, labor costs, yield per acre, and return per hundred dollars invested.
5. Develop cash-flow estimates for a corn production enterprise.
6. Experiment with representative plots of corn in the school land laboratory and determine the most feasible method of production.

Instructional Aids
1. The Good Seed--movie, DeKalb.
2. Salute to Corn--movie, DeKalb.
3. Why Dry Corn--movie, Vernard.
4. The Resistant Corn Rootworm--movie, Chevron.
5. Corn's Hidden Enemies--movie, Chevron.

6. Progress Report on Hi-Lysine Corn--movie, John Deere.
7. Cold-Tolerant Corn Varieties Coming--movie, John Deere.
8. Chemicals Protect Stored Wet Corn--movie, John Deere.
9. Corn Rootworm Control--movie, Farmland.
10. Cash in on Corn--movie, Farmland or Fertilizer Institute.
11. Down Where It Counts--movie, Farmland.
12. Make It a Safe Harvest--movie, Farmland.
13. Corn...--movie, Illinois VAS.
14. Corn Belt--movie, Illinois VAS.
15. The Enemy Below--movie, Sterling Movies.
16. A New Day in Corn--movie, Sterling Movies.
17. Breeding Better Corn--movie, ISU Media Center.
18. The Hybrids--movie, ISU Media Center.
19. Hole in the Pocket--movie, ISU Media Center.
20. 304 Bushel Challenge--movie, ISU Media Center.
21. The Seed You Sow--series of movies, ISU Media Center.
22. Corn Harvest Festival--movie, ISU Media Center.
23. Great Story of Corn--movie, ISU Media Center.
24. Pollination in Zea Maize--movie, ISU Media Center.
25. Pollen Release in Zea Maize--movie, ISU Media Center.
26. Life Cycle and Rearing Methods of the European Corn Borer--movie, ISU Media Center.
27. Time Lapse Views of Corn Germination--filmloop, NASCO.
28. Planting Corn--filmstrip, 1972, Illinois VAS.
29. Tillage Systems for Corn--slideset, pamphlet, and script, 1972, Ohio State University.
30. Life Without Corn--filmstrip and cassette, 1971, Kent Feeds, Inc.
31. Evolution in Marketing Farm Products--filmstrip and script, #113-1, California VEP.
32. Profitable Corn Production--Instructor's Guide, Illinois VAS.
33. Corn Insects--programmed instruction, #402, Illinois VAS.
34. Insect Picture Sheets--#1 (Stored Grain Insects), #4 (Above Ground Corn Insects), #5 (Below Ground Corn Insects), University of Illinois Extension Entomologist.
35. DeKalb Operation Top Profit--workbook, DeKalb.
36. Grain Moisture Tester, NASCO.
37. Tissue Test Kit, #Z2554N-5026, NASCO.

Soybean Production

Problem Areas

- A. Opportunities in soybean production
- B. Seed selection
- C. Seedbed preparation
- D. Planting methods and practices
- E. Fertilizers: rates and application
- F. Pests: weeds, insects and diseases
- G. Harvesting and storing
- H. Marketing
- I. Production economics

Competencies and Learning Activities

A. Opportunities in soybean production

Competencies - students will be able to:

1. Interpret the trends in soybean production in Iowa.
2. Recognize the advantages and disadvantages of soybean production.

3. Identify the special commercial and industrial uses of soybeans.
4. Recognize the importance of soybeans in daily living.
5. Identify the occupational opportunities related to soybean production.

Learning activities:
1. Analyze the home farm for soybean production opportunities.
2. Chart soybean acreage trends in the United States, in Iowa and in the county.
3. Develop a crop rotation plan that includes soybeans.
4. Compare the feed value of soybeans to other kinds of protein sources.
5. Refer to their notes on the importance and the uses of soybeans. (see unit on "Agronomic Opportunities: Economic and Occupational")

B. Seed selection

Competencies - students will be able to:
1. Identify the parts of the soybean seed and explain the functions of each part.
2. Read and evaluate the tag on a bag of soybean seed.
3. Calculate the number of bushels of soybean seed that would be needed to plant a certain number of acres.
4. Adjust the recommended seeding rate for soybeans to allow for differences in purity, germination, seed size and row width.
5. Determine the days of maturity of different soybean varieties and select those varieties that would be adapted to the local community.
6. Distinguish between determinate and interdeterminate types of soybean plants.
7. Select the desired soybean varieties to plant considering maturity, disease resistance, lodging resistance, insect resistance, row spacing and yield level.
8. Explain the purpose and procedure in inoculating soybean seed.
9. Describe why one variety matures earlier than another.

Learning activities:
1. Evaluate the test results on various soybean varieties.
2. Dissect and identify the parts of the soybean seed.
3. Pass out a variety of soybean seed sizes and discuss the effect of seed size on planting rate.
4. Bring in samples of bin run soybeans and determine purity and germination.
5. Discuss the procedure used in developing a new variety of soybeans.
6. Determine sources of certified soybean seed in the community.
7. Plan demonstration plots showing different soybean varieties.
8. Make a display of recommended varieties grown in the community.
9. Visit a farm which produces certified soybean seed.
10. Visit soybean demonstration plots to observe yields of various varieties.
11. Select desirable seed from samples.

C. Seedbed preparation

Competencies - students will be able to:
1. Identify the characteristics of a good seedbed.

2. Discuss the tillage practices used to prepare a good soybean seedbed.
3. Compare the cost of various tillage systems.
4. Identify and evaluate the various tillage equipment needed to produce a soybean crop.
5. Compare the relative advantages of using minimum tillage and conventional tillage systems in soybean production.
6. Prepare a good seedbed for soybeans.

Learning activities:

1. Observe various methods of seedbed preparation being used in the community.
2. Conduct a test plot showing the effect of tillage systems on emergence, weed control, yield and production costs.
3. Evaluate experimental data on tillage systems used on different soil types.
4. Estimate the numbers of working days available in the fall and in the spring for soybean seedbed preparation.
5. Evaluate problems with control of weeds, insects and erosion due to seedbed preparation methods.

D. Planting: methods and practices

Competencies - students will be able to:

1. Evaluate the most recent research findings pertaining to time of planting, depth of planting, width of rows, spacing within the rows, and method of planting.
2. Explain the advantages and disadvantages of planting soybeans in narrow rows.
3. Estimate the number of acres required to pay the cost of changing to narrow row equipment.
4. Identify the types of planting equipment.
5. Calibrate planting equipment to get the desired planting rate.
6. Correctly plant soybeans for specific crop.

Learning activities:

1. Observe various planting methods being used in the community.
2. Evaluate test plot results on planting dates, rates, width of row and methods of planting.
3. Conduct a test plot on planting methods and practices.
4. Calculate the number of bushels of soybean seed needed to plant the home farm acreage.
5. Determine actual planting depth and planting rate, and then adjust planter as needed.
6. Plant soybeans at various depths in a flat in the classroom to observe germination and emergence.
7. Take field trip to a student's home farm at planting time to assist in planting the student's soybean project.

E. Fertilizers: rates and application

Competencies - students will be able to:

1. Describe the importance of the major nutrients, secondary nutrients and micro-nutrients in the production of soybeans.
2. Determine where in the cropping system the recommended fertilizer should be applied.

3. Determine the optimum pH range for soybean production.
4. Evaluate plant analysis methods of determining nutrient needs.
5. Identify nutrient deficiency symptoms in soybeans.
6. Recognize the importance of proper fertilizer placement for soybeans.
7. Recognize the different methods of applying fertilizer to soybeans.
8. Calculate the rates of fertilizer to apply to get the maximum return per fertilizer dollar invested.
9. Plan a fertilizer program for a specific soybean enterprise.
10. Apply fertilizer to soybean enterprise.

Learning activities:
1. Plan demonstration plots showing results of different rates and methods of fertilizer application.
2. Plan a fertilizer program for soybeans based on soil test results and compute the cost of fertilizer program.
3. Secure and analyze reports of experimental fertilizer programs with soybeans.
4. Display plant specimens illustrating plant food deficiencies.
5. Compare the advantages and disadvantages of broadcast, row and foliar fertilizer application.
6. Observe methods of fertilizer application being used in the community.
7. Take field trips to observe fertilizer application.

F. Pests: weeds, insects, and diseases

Competencies - students will be able to:
1. Identify the pests that are of major concern in the production of soybeans in the community.
2. Describe the practices being used in the community to control soybean pests and evaluate their effectiveness.
3. Compare cultural controls to chemical controls of soybean pests.
4. Recognize the pesticides being used to control soybean pests: forms, rates, methods of application, effectiveness, costs and dangers.
5. Summarize the precautions which should be followed when using pesticides.
6. Calibrate pesticide applicators.
7. Identify pest and pesticide damage in soybeans.
8. Recognize the importance of crop rotation (see unit on "Pests of Agricultural Crops: Insects, Diseases, and Weeds").
9. Control pests of soybeans on home farm.

Learning activities:
1. Collect specimens of soybean pests which should be controlled.
2. Invite representatives of local chemical companies to discuss soybean pest control.
3. Take field trips to observe pest control practices being used by farmers in the community.
4. Conduct test plots comparing various cultural and chemical treatments.
5. Study samples or labels of recommended pesticides used on soybeans.
6. Calibrate pesticide applicators.

7. Take a field trip to inspect and take pictures of damage from soybean pests and determine whether it is feasible to apply control.
8. Survey the community to determine the most popular methods used to control soybean pests.

G. Harvesting and storing

Competencies - students will be able to:

1. Determine the major sources of soybean harvesting loss, the percentage loss from each source, and the procedure in minimizing each type of loss.
2. Obtain a sample of soybeans, determine the moisture percentage and determine whether it is ready for harvesting.
3. Determine whether it is more economical to own harvesting equipment for soybeans or to hire a custom operator.
4. Make the necessary adjustments on soybean harvesting equipment for efficient operation.
5. Calibrate the costs of storing soybeans and determine whether it is advantageous to store.
6. Identify materials and methods used in cleaning and fumigating storage structures.
7. Select a harvesting and storage system for soybeans based on efficiency and economy.
8. Treat stored soybeans for pest control.
9. Calculate the volume of a structure needed to store a specified number of bushels of soybeans.
10. Harvest beans with less than one bushel per acre field loss.

Learning activities:

1. Visit successful farmers at harvest time to observe harvesting practices followed for maximum yields.
2. Check a field being combined and compute the harvesting losses.
3. Take trip to local elevator and observe the procedures for taking samples, making a moisture test, and determining test weights.
4. Operate a grain moisture tester using soybeans.
5. Observe a representative of an equipment company demonstrate the adjustments on a combine in soybean harvesting.
6. Students will use the operator's manual for a combine they may be operating and determine the recommended adjustments for a good job of soybean harvesting.
7. Take field trips to observe different storage facilities for soybeans.
8. Clean and fumigate a storage bin on the farm of one of the students.
9. Students will bring in samples of damaged soybeans from home farm storage facilities and determine the cause of damage.
10. Send soybean samples to a laboratory to be analyzed for quality after various lengths of storage.
11. Measure different shaped storage structures and estimate the number of bushels soybeans that can be stored.

H. Marketing

Competencies - students will be able to:

1. Market soybeans to best economic advantage.
2. Locate market outlets for soybeans.
3. Determine market grade requirements for soybeans.
4. Discount the price of soybeans for test weight, moisture and damage.

5. Explain the relationship between the livestock industry and the soybean market.
6. Explain the purpose of the futures contract in soybean marketing.
7. Identify sources of soybean marketing information.
8. Explain how local soybean prices are determined.
9. Select the month when it would be most profitable to market soybeans.
10. Describe the supply and demand relationship for soybeans.

Learning activities:

1. Visit a local soybean elevator to observe the grading, weighing, moisture and damage determination.
2. Visit a grain exchange or a branch office and observe price determination and posting.
3. Students will being samples of soybeans from home farm and grade them.
4. Sponsor a Hay and Grain Show including soybeans.
5. Chart the soybean market prices and determine seasonal trends.
6. Locate soybean markets available to the local area.

I. Production economics

Competencies - students will be able to:

1. Calculate various efficiency factors in soybean production.
2. Budget the annual costs and returns in soybean production.
3. Determine realistic goals in soybean production.
4. Keep and analyze production records for soybean enterprise.
5. Determine results obtained from the modification or adoption of new practices and compare the results with those obtained from experimental studies and local demonstration plot.

Learning activities:

1. Compare the net return per acre for soybeans with principal competing crops produced on a given farm and decide whether to increase soybean acreage.
2. Using a sample set of soybean records, the student will calculate the costs, returns and efficiency factors involved in soybean production.
3. Study outlook information on planting intentions, weather, domestic and foreign demand and government programs to determine the profit potential in soybean production.
4. Determine cost per bushel, machine cost per acre, labor cost, yields per acre and returns per $100 invested in the soybean enterprise on the home farm.
5. Develop cash flow estimates for a soybean production enterprise.
6. Secure and analyze efficiency factors from experimental studies, farm business associations and efficiency contests. Compare these factors with similar efficiency factors from local farms.
7. Compare soybean efficiency factors for several years on the home farm and note any significant changes.

Instructional Aids

1. Soybean Experts' Prescription for Top Yields--movie, John Deere.
2. Battle Report-Underground War on Weeds--movie, Farmland.
3. Growing Soybeans--movie, Fertilizer Institute.
4. Run For the Money--movie, Illinois VAS.

5. Hand Cross-Pollination of the Soybean--movie, ISU Media Center.
6. Root Nodule Formation in Glycine Max--movie, ISU Media Center.
7. Science and Agriculture--movie, ISU Media Center.
8. Phase III--movie, ISU Media Center.
9. Time Lapse Views of Bean Germination--filmloop, NASCO.
10. Grow Soybeans, Not Weeds--movie, Chevron.
11. Development of the Soybean Plant--slideset, ISU Visual Instructional Service.
12. Recognizing Herbicide Injury--slideset, Illinois VAS.
13. Using Pre-Emergence Herbicides--filmstrip, Illinois VAS.
14. Factors Affecting Classes and Grades of Soybeans--filmstrip, Illinois VAS.
15. How the Soybean Plant Develops--slideset, ISU Media Center.
16. Soybean Production and Marketing--transparencies, Vo-Ag Visuals.
17. American Soybeans 1973--slideset, American Soybean Association.

Forage Production: Hay, Pasture, and Silage

Problem Areas

A. Opportunities in forage production
B. Forage identification and seed selection
C. Tillage and planting
D. Fertilizers and lime
E. Pests: weeds, insects and diseases
F. Harvesting, storing, and marketing
G. Production economics

Competencies and Learning Activities

A. Opportunities in forage production

Competencies - students will be able to:

1. Explain the comparative advantages of forages in a farming program.
2. Estimate the economic value of an acre of forage as hay, silage, or pasture.
3. Categorize forages as annuals, biennials, or perennials and as either grasses or legumes.
4. Determine the major forage crops grown in the United States and in Iowa.
5. Identify the specialized uses of various forage crops such as birdsfoot trefoil, sweetclover, crown vetch, reed canarygrass and sudangrass.
6. Interpret the trends of forage production in the United States, in Iowa, and in the county.
7. Select the correct forage for a specific purpose on a given farm.
8. Identify occupational opportunities that are related to forage production.

Learning activities:

1. Students refer to their notes on the importance and uses of forages (see unit on "Agronomic Opportunities: Economic and Occupational").
2. Analyze the home farm for forage production opportunities.
3. Compare the feeding value and palatability of forages in livestock rations.

4. Chart the forage crop acreage in the county and in the state and identify any new trends.
5. Describe specific forages for permanent pastures, rotational pastures, temporary pastures, green manures, haylage, silage, seed production, erosion control, and marketable forage crops.
6. Estimate the economic value of forage crops in the county and in the state.

B. Forage identification and seed selection

Competencies - students will be able to:

1. Identify grass and legume seeds of forage crops grown locally.
2. Select adapted varieties of forage crops.
3. Identify grass and legume seedlings.
4. Select high quality seed.
5. Explain the purpose of vernalization and scarification in forage crop production.

Learning activities:

1. Prepare a collection of forage crop seeds and seedlings.
2. Study pictures, slides and actual specimen of grass and legume seeds and plants that are grown locally.
3. Evaluate variety test results conducted by experiment stations and seed companies.
4. Conduct test plots which show varietal differences in forages.
5. Plant a demonstration plot showing the various grasses and legumes.
6. Determine the germination and purity of a forage seed sample and calculate the percent pure live seed.
7. Visit a seed company and observe practices involved in forage seed production and processing.
8. Interpret the data found on a tag from a bag of forage seed.

C. Tillage and planting

Competencies - students will be able to:

1. Describe the tillage practices required for the establishment and renovation of temporary, rotation and permanent pastures.
2. Determine seeding rates and depth of planting.
3. Identify equipment and methods used in establishing forage stands.
4. Compare broadcast seeding to drilling.
5. Obtain a good stand of a new seeding.
6. Evaluate the old stand of forage and determine the practices and procedure needed to improve the stand.
7. Analyze the comparative costs of different production methods of producing forages.

Learning activities:

1. Students take a field trip to a farm where complete pasture renovation is taking place to observe pasture renovation and tillage operations.
2. Students conduct experiments in laboratory with soil flats representing different methods of seedbed preparation.
3. Contact outlying experimental farms for any test data that they might have on tillage practices for forage production.
4. Check with older farmers in the community to learn "rule of thumb" methods used to determine adequate seeding rates.

5. Determine the proper combinations of grasses and legume mixtures.
6. Determine the pounds of seed required to plant a given legume acreage.

D. Fertilizers and lime

Competencies - students will be able to:

1. Recognize major plant food deficiency symptoms in growing forages.
2. Outline the steps in forage improvement, fertilization and liming.
3. Make fertilizer recommendations for forages from a soil test report.
4. Calibrate fertilizing equipment.
5. Develop a fertilization program for small grains and subsequent forage crops.
6. Determine the optimum pH range for forage production.
7. Recognize the different methods of applying fertilizer on forages.

Learning activities:

1. Develop a forage fertilizer program for a specific farm situation.
2. Interpret a soil test report for forage production and make recommendations.
3. Fertilize a forage test plot to show differences in yield response.
4. Display forage specimen illustrating plant food deficiencies.

E. Pests: weeds, insects and diseases

Competencies - students will be able to:

1. Distinguish between insect, disease and weed damage to forage plants.
2. Identify a potential damaging insect, weed or disease problem.
3. Choose proper pesticides to be used on forages.
4. Recognize the residue limitations or restrictions on forage pesticides.
5. Estimate the economic loss due to reduced yield, increased harvesting loss, or reduced quality, that can be attributed to forage pests.
6. Describe the practices being used in the community to control forage pests and evaluate their effectiveness.
7. Summarize the precautions which should be followed when using pesticides.
8. Calibrate pesticide applicators.
9. Explain the importance of crop rotation in the control of forage pests (see unit on "Pests of Agricultural Crops: Weeds, Insects and Diseases").

Learning activities:

1. Students make a collection of forage pests which should be controlled.
2. Student invite a representative of a local chemical company to discuss forage pest control.
3. Take a field trip to observe pest control practices being used by farmers in the community.
4. Students study the labels of recommended pesticides to be used on forages.
5. Students calibrate pesticide applicators.

6. Take a field trip to inspect and take pictures of damage from forage pests and determine whether it is feasible to apply control.
7. Survey the community to determine the most popular methods used to control forage pests.

F. Harvesting, storage and marketing

Competencies - students will be able to:

1. Recognize possible bloat problems and recommend preventative measures.
2. Explain the need for root reserves and/or leaf area for proper regrowth.
3. Determine efficiency gained by rotational grazing patterns within a field.
4. Recognize the effect of grazing too early, overgrazing or clipping on forage yields.
5. Determine the optimum moisture content for beginning machine harvest to insure proper storage and preservation.
6. Recognize the proper stage of maturity to harvest for highest quality forage.
7. Evaluate the quality of forages being fed.
8. Evaluate the alternative costs of different forage harvesting and storage methods.
9. Use weather information to reduce risk of rain damage in forage harvesting.
10. Use machinery efficiently to minimize harvest time.
11. Compute tonnage of forage in various shaped storage structures.
12. Compute the carrying capacity of pastures.
13. Determine the value of forages in a crop rotation.
14. Recognize common forage problems: winterkill, disease, herbicide carryover.
15. Determine the relative nutrient value of silage, green chop, and haylage.
16. Identify safety hazards present in harvesting, transporting and storing forages.
17. Explain the comparative advantages of various forage storage structures.
18. Identify and explain the operating principles of forage handling and storage equipment.
19. Explain how local prices for forages are established in the local community.
20. Describe the problems involved in marketing forages.
21. Determine the market grades of hay.
22. Explain the criteria for quality forages: odor, color, leafiness and freedom of foreign material.
23. Select the month when it would be most profitable to market forages.
24. Adjust machines used in harvesting forages and forage seeds.
25. Describe the commercial products used for storage and their methods of application.
26. Determine the relative advantages of conditioning forages.
27. Condition hay.

Learning activities:

1. Students discuss the causes of bloat and methods of control with the local veterinarian.
2. Students examine fields which have been clipped or grazed too closely and report what has happened to regrowth ability.

3. Attend a pasture field day to observe results of different grazing patterns within a field.
4. Observe a dehydration products operation and list livestock feeds which contain these products.
5. Graphically show the growth patterns of various pasture forages and develop a full-season grazing program.
6. Estimate the livestock carrying capacity of a pasture.
7. Sponsor a hay and grain show.
8. Evaluate samples of hay and silage for color, odor, leafiness and foreign matter content.
9. Send forage samples to a testing laboratory to determine actual nutrient content.
10. Chart the seasonal trends in forage marketing and select the best time to market forage crops.
11. Visit a rotational or permanent pasture and determine the amount and causes of winterkill.
12. The student will identify the stage of maturity of forage crops and determine the best time to market forage crops.
13. Compare forage harvesting and handling methods and select the best method for a given situation.
14. Visit a farm where one-man haying systems are used and observe the principles of operation.
15. Observe the difference in quality between conditioned and nonconditioned forages.

G. Production economics

Competencies - students will be able to:

1. Calculate various efficiency factors in forage production.
2. Determine realistic goals in forage production.
3. Determine results obtained from the modification or adoption of new practices and compare these results with those obtained from experimental studies and local test plots.
4. Justify the production of forages on Class I and II land.
5. Develop equitable rental or leasing arrangements for pasture and forage cropland.
6. Budget the costs and returns on a forage crop using sample records.
7. Determine the value of forage crops marketed through livestock.
8. Determine government cost-sharing on pasture improvement projects.

Learning activities:

1. Compare the net returns per acre for forage crops with the principal competing crops on a given farm and determine whether forage crops acreage should be changed.
2. Using a sample set of forage crop records, the student will figure the costs, returns and efficiency factors involved in forage productinn.
3. Develop a cash flow sheet for forage production.
4. Determine the yields per acre, cost per ton, machine cost per acre, labor costs, and return per $100 invested in the forage acreage on the home farm. Compare them to the annual goals.
5. Compare the efficiency factors for past years on a given farm and explain any significant changes.
6. Compute the value of forages marketed as meat, wool or milk.

7. Obtain various landlord-tenant agreements and list the various ways that pasture rental and forage crop acreages are handled.
8. Compare the costs of buying, leasing or hiring forage handling equipment.

Instructional Aids

1. Why Bale Hay--movie, Venard.
2. 10 Steps to 10 Ton Alfalfa--movie, John Deere.
3. Better Alfalfa With Better Harvest Dates--movie, John Deere.
4. New Silage Additives Show Promise--movie, John Deere.
5. Promising New Alfalfa Variety--movie, John Deere.
6. Alfalfa in the Age of Automation--movie, Illinois VAS.
7. Alfalfa, Queen of the Forages--movie, Illinois VAS.
8. Alfalfa Story--movie, Illinois VAS.
9. Better Seeds for Better Grasslands--movie, Illinois VAS.
10. Green Mantle--movie, Illinois VAS.
11. Makin' Hay--movie, Illinois VAS.
12. It's More Than Hay--movie, ISU Media Center.
13. Growing Alfalfa Successfully--movie, ISU Media Center.
14. 1 Billion Acres of Grass--movie, ISU Media Center.
15. Pasture Balance--worksheet, #BF 63, University of Missouri Instructional Materials Laboratory.
16. Recommended Varieties--annual chart, Iowa Crop Improvement Association.
17. Insect Net, NASCO.
18. Small Seed Legume Types--seed kit, #LS355P, NASCO.

Pests of Agricultural Crops: Insects, Diseases and Weeds

Problem Areas

A. Insects
B. Diseases
C. Weeds
D. Cultural control
E. Chemical control

Competencies and Learning Activities

A. Insects

Competencies - students will be able to:

1. Identify the major crop pests of corn, soybeans, small grains and forages.
2. Classify insect pests as chewing, sucking, internal feeding and subterranean feeding insects.
3. Trace the life cycle of major crop insects.
4. Identify plant damage due to insects and estimate the percentage of infestation.
5. Identify insect pests that are irritants, disease carriers, or harmful to man and livestock.
6. Recommend cultural and chemical methods of insect control.
7. Identify insects which damage stored grain.
8. Recommend control methods for insect damage in stored grains.

Learning activities:

1. Identify specimens, slides or pictures of common insect pests.

2. Using a collection net, students will determine the number and kinds of insects present in a crop field.
3. Student will bring to class examples of insect-damaged crops.
4. Students will conduct a periodic field survey to determine corn borer infestation, stage of development and optimum time for chemical control application.
5. Students will make a collection of common insect pests.
6. Students will trace the life cycle of the major crop pests - i.e., corn borer, rootworm, and identify overwintering hosts.
7. Students will sample stored grain to determine any insect problems and recommend control measures for those specific problems.
8. Students will trace the life cycle of an insect harmful to man or livestock and make recommendations for their eradication.
9. Discuss cultural practices, natural predators of insects, and inheritable insect resistance bred into some crop varieties.

B. Diseases

Competencies - students will be able to:

1. Identify the major diseases of corn, soybeans, small grains and forages.
2. Identify the agents and conditions that cause plant diseases and the plants that are affected.
3. Estimate the economic loss due to decreased yield, increased harvesting loss or reduced quality caused by diseases.
4. Recommend cultural practices and chemicals that will help control specific plant diseases.

Learning activities:

1. Student will identify specimens, slides or pictures of major crop diseases.
2. Students will bring to class examples of diseased crop plants.
3. Students select varieties from yield trial results which are resistant to, or tolerant to many diseases of the particular crop.
4. Students trace the life cycle of one of the major plant diseases.
5. Students will estimate the economic effect of a widespread disease, southern corn leaf blight in 1970 for example.
6. Students will visit a crop improvement station or plant breeder and discuss inheritable resistance to diseases.
7. Students develop a set of cultural and chemical practices for disease control on a given farm.

C. Weeds

Competencies - students will be able to:

1. Identify primary and secondary noxious weeds.
2. Identify other common weeds in the area.
3. Describe ways that weeds are harmful, i.e., irritants of man, poisonous, or reduce feeding value.
4. Define "weed."
5. Classify weeds as annuals, biennials or perennials.
6. Determine ways that common weeds spread and reproduce.
7. Estimate yield decrease due to weeds.
8. Recommend cultural practices which aid in weed control.
9. Recommend available chemical control for specific weed problems in major economic crops.

10. Students will identify plants that are poisonous to livestock or are irritants to man.

Learning activites:

1. Students will identify specimen seeds, slides or pictures of noxious, common or poisonous weeds.
2. Prepare a collection of specific weeds and their seeds.
3. Using soybean weed survey, students will estimate the decrease in yield expected due to weeds in various soybean fields.
4. Students will identify poisonous plants or irritants found on most farmsteads and suggest treatment.
5. Students will review the Iowa Weed Laws.
6. Visit test plots showing the effect of various herbicides.
7. Manage a weed control test plot using various cultural and chemical treatments.
8. Devise a weed control program for a specific farm or home site.

D. Cultural control

Competencies - students will be able to:

1. Describe the effect of crop rotation, crop residue handling, and tillage on control of agronomic pests.
2. Describe the effect of fertilization and planting practices on the control of agronomic pests.
3. Identify insect and disease pests that can be prevented or controlled by varietal resistance.
4. Compile the cost and consider timeliness of control of agronomic pests by cultural methods.

Learning activities:

1. Students visit with farmers and determine pest control methods used by them before chemicals became widely available.
2. Visit an organic farmer who uses only cultural methods of pest control.
3. Students conduct a test plot showing the effect of resistant and susceptible varieties of plants.
4. Students determine the cost per acre and effectiveness of cultural pest control.
5. Students determine labor and machine requirements of cultural pest control (one rotary hoeing, two cultivations and hand weeding of soybeans).

E. Chemical control

Competencies - students will be able to:

1. Select a specific chemical and application method for the control of a specific agronomic pest.
2. Describe the effect of a specific chemical on a pest. For example, describe the way a chemical kills: soil sterilizer, stomach poison, contact killer, or growth stimulant.
3. Describe the selectivity of a specific chemical, its effect on man and the environment, and its residual qualities.
4. Determine the rate of application needed for the desired pest control.
5. Calculate the cost of chemical pest control for specific crops.

6. Discuss the factors that affect application rate per acre and calibrate the application equipment.
7. Identify plant symptoms of chemical overdose.
8. Store, handle and apply chemicals effectively and safely.
9. Apply first-aid to victims of chemical contact.
10. Discuss the increase in crop production due to chemical pest control.

Learning activities:

1. Students develop a chart showing the effectiveness of a specific chemical on various agronomic pests.
2. Visit a test plot and evaluate the effectiveness of various pesticide treatments.
3. Interpret and apply the information found on a chemical container label.
4. Determine the application rate per acre that is required and calculate the output of a sprayer.
5. Develop a chemical control program for specific pest problems found on a given farm.
6. Discuss safety equipment and procedures required for the safe handling and use of chemicals.
7. Explain the procedures needed for the safe storage of chemicals and for the safe disposal of empty containers and unused chemicals.
8. Survey untreated check rows in the test plot to determine the effectiveness of specific chemical treatments.
9. Survey a field after chemical treatment to determine the chemical's effect on nonpests as well as on pests.
10. Determine the cost per acre of chemical pest control.
11. Determine the labor and equipment required for chemical pest control.
12. Estimate the yield increases in recent years that are due primarily to chemical pest control.
13. Review pesticide control regulations that apply to the chemical effects on man and the environment.

Instructional Aids (Crops)

1. Prescription for Safety--movie, Chevron.
2. Away with Weeds--movie, Chevron.
3. Safe Use of Pesticides--movie, Chevron.
4. Ultra-violet Sheds New Light on Herbicide Incorporation--movie, John Deere.
5. Virus Control of Insect Pests--movie, John Deere.
6. Fight Insect Damage with Insects--movie, John Deere.
7. Predict Problems with Weed Seed Analysis--movie, John Deere.
8. Ramrod, A Tool for Making Money--movie, Farmland.
9. World of Sevin--movie, Farmland.
10. Grasshoppers Can Be Controlled--movie, Illinois VAS.
11. Insect Enemies and Their Control--movie, Illinois VAS.
12. Pests or Plenty?--movie, Illinois VAS.
13. Safe Use of Pesticides--movie, Illinois VAS.
14. Pesticides: Fundamentals of Proper Application--movie, Sterling Movies.
15. Pssst--movie, ISU Media Center.
16. 500,000 to 1--movie, ISU Media Center.
17. Wanted: Plant Pest Detectives--movie, ISU Media Center.

18. Who Shall Reap--movie, ISU Media Center.
19. The Wicked World of Weeds--filmstrip, 1972, Illinois VAS.
20. Tillage Alternatives--filmstrip and cassette, USDA.
21. Safe Use of Pesticides on the Farm--filmstrip and cassette, USDA.
22. The Balance of Nature--filmstrip and cassette, 1972, Kent Feeds, Inc.
23. Weed Identification--slideset and script, University of Missouri Instructional Materials Laboratory.
24. Introduction to Agricultural Chemicals and Their Safe Storage and Use--slideset and script, ISU Media Center.
25. Field Sprayer Calibration--transparencies, IVATA.
26. Agricultural Chemical Safety--transparencies, California VEP.
27. Weed Control: Cultural and Chemical--transparencies, Ohio State University.
28. Agricultural Chemicals--1972 study guide, Ohio State University.
29. Pesticides: Agriculture and the Environment--study guide, CIBA-Geigy.
30. Pesticide Lesson Plans for Vocational Agriculture--study guide, 1967 CIBA-Geigy.
31. Agricultural Chemicals--student manual, 1968, Ohio State University.
32. Insect Identification Manual--manual, #122-1, California VEP.
33. Principal Stored Grain Insects--pictures, PM 463-1, ISU Media Center.
34. Corn Insects Above Ground--pictures, PM 463-4, ISU Media Center.
35. Common Soybean Insects--pictures, PM 463-6, ISU Media Center.
36. Common Small Grain Insects--pictures, PM 463-7, ISU Media Center.
37. Common Forage Legume Insects--pictures, PM 463-8, ISU Media Center.
38. Weed, Trees and Turf Information Index: References for Weed Control--catalog of materials, Weeds, Trees and Turf of Cleveland, Ohio.
39. Agricultural Chemical Safety--Teacher Handbook, #101-2, California VEP.
40. Labels from various pesticide containers, local chemical dealers.
41. Seed Display Box and Vials--seed kit, #K96P and K97P, NASCO.
42. Diseases of Grain--disease kit, #LS377P, NASCO.
43. Weed Seed Collection--weed kit, #LS332P, NASCO.
44. Weed Identification Kit--ISU Agronomy Club.

Instructional Aids (Soils)

1. The Big Test--movie, Farmland.
2. Understanding Our Earth--movie, Farmland.
3. The World at Your Feet--movie, Farmland.
4. Arteries of Life--movie, Illinois VAS.
5. Our Soil Resources--movie, Illinois VAS.
6. The Story of Soil--movie, Illinois VAS.
7. This Land is Ours--movie, Illinois VAS.
8. Water Movement in Soils--movie, Illinois VAS.
9. Our Living Soil--filmstrip and script, Fertilizer Institute.
10. How to Take a Soil Sample--slideset and script, Fertilizer Institute.
11. Soil Science--transparencies, Texas Core Unit Voc Ag IV, Texas A & M
12. Soil Classes Kit--soil samples, #LS519P, NASCO.
13. Soil Thermometer, #H792N, NASCO.
14. Hand Levels, #N241P-5556, NASCO.
15. Soil Test Kit, #F11N-1A, NASCO.
16. Soil Probe, #F320W, NASCO.
17. Soil Judging Scorecards, local Soil Conservation Service Office.

EVALUATION

The competencies listed in this curriculum guide can be evaluated in several different ways by people with different points of view. Listed below are some of the suggested means of evaluation.

1. Written examinations of an objective and subjective nature can be used to measure student achievement and improvement. The guidance counselor has interest tests to measure changes in preference and attitude.
2. Students may evaluate themselves. Individual strengths and areas needing improvement are identified by the student himself.
3. Evaluate individual student records entered in the Iowa Vocational Agriculture Record Book.
4. Evaluate student retention and application of various competencies to home farm enterprises during farm visitation.
5. Teacher evaluation may be used to compare intangibles such as attitudes, interests, and understandings. This form of evaluation may be used extensively in a laboratory situation where student work is compared to that of other students and to class standards established by the instructor, based on his experience.
6. Attendance and participation can be used. Agronomic science classes and post-secondary classes are in most cases voluntary. Increasing attendance and enthusiastic participation indicate that the course offering is considered worthwhile and beneficial.
7. Iowa school systems have a periodic evaluation of the teaching program and the department - i.e. NCA evaluations. "Evaluative Criteria for Agriculture," published by the National Study of Secondary School Evaluation can also be used for self-evaluation.
8. Comparison of annual reports such as State Form A-3 is an indication of improvement. Participation in competition such as soil judging contests, crop raising contests and FFA Proficiency Awards Programs are all indicators of achievement in agriculture due in part, at least, to classroom instruction.
9. Employability and occupational advancement should be the ultimate evaluation of a vocational program.
10. Students should be urged to evaluate themselves on the competencies attained and applied in their home farm or in other occupational experience situations.
11. Instructor evaluations may be made in terms of percentage of students attaining and using competencies.
12. Longtime evaluation may be made in terms of increased net income from crop enterprises, increased production per acre, increased quality of crops produced, and in decreased costs of production per unit produced.

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2. CHOOSE YOUR CAREER IN AGRICULTURE, Hoards Dairyman.
3. EXPLORING CAREERS IN MODERN AGRICULTURE, Penn. State University.
4. FARMERS AND AGRICULTURE IN OUR ECONOMY, Illinois VAS.
5. IOWA WHERE INDUSTRY AND AGRICULTURE MEET, Des Moines Register.
6. AGRICULTURAL CAREERS THAT IMPROVE THE QUALITY OF LIFE, RESTORE THE ENVIRONMENT, FEED THE WORLD, 1972, Maryland State Dept. of Ag. Ed.
7. CAREERS IN AGRICULTURE, Farmland.
8. BACKGROUND ON U.S. AGRICULTURE, #491, USDA.
9. CENSUS OF AGRICULTURE, 1969, Bureau of the Census.

10. COUNTY PLAT BOOK, local courthouse.
11. AGRICULTURAL STATISTICAL REVIEW, USDA.
12. AGRICULTURAL STATISTICS, 1972, USDA.
13. THE BUSINESS OF AGRICULTURE, Iowa Development Commission.
14. IOWA FARM OUTLOOK, ISU Extension.
15. DEFINING SOILS AND WATERSHEDS, Conservation Aide II, 1972, Ohio State.
16. UNDERSTANDING SOILS, 1972, #4052, Illinois VAS.
17. AGRONOMY SCHOOL PROCEEDINGS, 1973, ISU Extension.
18. EXPERIMENTS IN SOIL SCIENCE, #147-1, California VEP.
19. IOWA SOIL SURVEYS, soil information by soil series, 1970, USDA & SCS.
20. INTRODUCTORY EXPERIMENTAL SOIL SCIENCE, Stipes.
21. TAKE A GOOD SOIL SAMPLE, PM 287, ISU Extension.
22. UNDERSTANDING YOUR SOIL TEST REPORT, PM 429, ISU Extension.
23. MINIMUM TILLAGE, #4041, Illinois VAS.
24. OUR LAND AND ITS CARE, Fertilizer Institute.
25. CAREERS IN SOIL CONSERVATION, #717, USDA.
26. MOISTURE FARM MANUAL, 1969, Standard Oil.
27. WEATHER MANAGEMENT, 1969, Successful Farming.
28. WEATHER FARM MANUAL, 1969, Standard Oil.
29. TILLAGE ALTERNATIVES FOR IOWA, 1970, PM488, ISU Extension.
30. CONTROLLING WIND EROSION IN IOWA, PM432, ISU Extension.
31. IOWA'S NEW CONSERVANCY DISTRICTS AND SOIL LOSS LIMIT REGULATIONS, PM536, ISU Extension.
32. THE SUBSOIL MOISTURE SITUATION, Ag 21-A, ISU Extension.
33. IMPROVE YOUR SUBSOIL MOISTURE FOR HIGHER YIELDS, FS 1370, ISU Extension.
34. IOWA'S DISAPPEARING ACRES-HOW MUCH? HOW FAST?, FS 1091, ISU Extension.
35. TESTING SOIL FOR PHOSPHORUS, 1969, Illinois VAS.
36. HUNGER SIGNS IN CROPS, #4011a, Illinois VAS.
37. THE FERTILIZER HANDBOOK, Fertilizer Institute or Farmland.
38. FERTILIZER SAFETY GUIDE, Fertilizer Institute.
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41. PLANNING THE NITROGEN PROGRAM, 4009a, Illinois VAS.
42. FERTILIZER FARMACY FILE, Farmland.
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44. FERTILIZER SUGGESTIONS FOR CORN YIELDS ABOVE 125 BUSHEL PER ACRE, #ST-5, ISU Extension.
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48. BETTER PASTURES WITH FERTILIZER, FS 1366, ISU Extension.
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53. APPROVED PRACTICES FOR OATS, Illinois VAS.
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56. FERTILIZING GRAIN SORGHUM FOR PROFIT, Farmland.
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58. OAT VARIETY PERFORMANCE, Ag 10, ISU Extension.
59. GRAIN SORGHUM PERFORMANCE, Ag 16, ISU Extension.
60. TESTING CORN, SOYBEANS, OATS, AND SORGHUM VARIETIES ON YOUR FARM, FS 1298, ISU Extension.
61. NEW MULTILINE OATS, FA 1349, ISU Extension.

62. RUSTS IN GRAIN CROPS, PM185, ISU Extension.
63. PROFITABLE CORN PRODUCTION, PM409, ISU Extension.
64. WHEN TO SELL CORN, SOYBEANS, OATS, WHEAT, Circ. 948, Illinois Extension.
65. FERTILIZE CORN FOR PROFIT, Farmland.
66. CORN GROWERS' GUIDE, 1968, PAG.
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69. CALENDARIZED ROW CROP PRODUCTION, FS 963, ISU Extension.
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71. P & K FERTILIZER FOR CORN-HOW TO APPLY, FS 1130, ISU Extension.
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73. GROWTH AND NUTRIENT UPTAKE BY CORN, PM 277, ISU Extension.
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81. BE YOUR OWN CORN DOCTOR, Fertilizer Institute.
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Washington, D.C. 20036

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Hudson, Iowa 50643

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550 W. Algonquin Road
Arlington Heights, Illinois 60005

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P.O. Box 7305
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Alexandria, Virginia 22309

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Urbana, Illinois 61801

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434 Mumford Hall
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112 Agronomy Building
Ames, Idowa 50010

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Federal Building, Room 855
210 Walnut Street
Des Moines, Iowa 50309

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Career Education Division
Grimes State Office Building
Des Moines, Iowa 50319

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250 Jewett Building
Des Moines, Iowa 50309

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832 Federal Building
Des Moines, Iowa 50309

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Agronomy Club
112 Agronomy Building
Ames, Iowa 50010

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Ames, Iowa 50010

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Media Resources Center
121 Pearson Hall
Ames, Iowa 50010

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Press Building
Ames, Iowa 50010

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2323 New Hyde Park Road
New Hyde Park, L.I., New York 11041

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1400 3rd Avenue
Moline, Illinois 61265

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P.O. Box 8718
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Stillwater, Oklahoma 74074

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102 Armsby
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1649 Tullie Circle, N.E.
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P.O. Box 4040
St. Paul, Minnesota 55116

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43 West 61st Street
New York, New York 10023

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10-12 Chester Street
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1716 Locust Street
Des Moines, Iowa 50303

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F.E. Box 182
College Station, Texas 77843

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Box 3100
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Clemson University
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1912 Grand Avenue
Des Moines, Iowa 50305

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126 Langdon Street
Madison, Wisconsin 53702

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Agribusiness and Natural
Resource Education

Curriculum Guide

AGRICULTURAL MECHANICS

A joint publication of:

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Ames, Iowa 50010

and

DEPARTMENT OF PUBLIC INSTRUCTION
Career Education Division
Grimes State Office Building
Des Moines, Iowa 50319

1973

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State of Iowa
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Grimes State Office Building
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SOURCE OF CURRICULUM GUIDES

The following ten curriculum guides in agribusiness and natural resources are available as a set from the Department of Public Instruction:

Agribusiness and Natural Resource Education

Animal Science

Agronomic Science

Agricultural Mechanics

Farm Business Management

Agricultural Supplies and Services

Agricultural Products Processing and Distribution

Horticulture

Agricultural Resources and Conservation

Occupational Experience in Agriculture

Order from Information and Publications Services Section, Department of Public Instruction, Grimes State Office Building, Des Moines, Iowa 50319.

Price, $5.00 per set of ten curriculum guides listed above. Please send remittance with order.

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FOREWORD

This curriculum guide is one of ten developed for use by vocational and technical agribusiness instructors in planning instructional programs to meet the needs of their students. Elementary teachers and instructors in other subject matter areas at the secondary level may find the guide of value in introducing principles of career education in their instructional programs. Although much of the material is designed for use at the secondary or postsecondary levels, many of the competencies may be introduced at the awareness or exploratory levels of career education.

Instructors in multiple-man departments at the secondary level and in postsecondary schools may organize nine-week or semester courses around the units and problem areas outlined in this guide.

Appropriate competencies and learning activities have been provided for each problem area. The competencies listed are those determined in previous studies as needed by persons employed in farming and in agricultural mechanics occupations. Instructional aids and references are listed for each unit.

A list of titles of occupations requiring competencies in agricultural mechanics has been included in the guide. It is assumed that only partial attainment of some competencies can be done at the secondary level. The competencies may not be mastered until the student has completed additional preparation at the postsecondary, young or adult class, or collegiate levels. It is assumed that "hands-on" and occupational experience will be provided with class and laboratory instruction at all levels.

Evaluation of the instruction in agricultural mechanics should be based largely upon attainment of the competencies listed in this guide, and on the application of them as students participate in occupational experience programs.

Allocations of units and of instructional time in the four-year sequence of courses at the secondary level are presented in the curriculum guide titled, Agribusiness and Natural Resource Education. Also presented are suggested activities involving agricultural mechanics for teachers at the kindergarten through sixth grade level, and suggested outlines of subject matter to be included in exploratory programs at the junior high school level.

Curriculum Guide, Agricultural Mechanics was prepared by Kenneth E. Haddock, Vocational Agriculture Instructor, Mason City, Iowa; N. Frank Hill, Vocational Agriculture Instructor, North Winneshiek, Decorah, Iowa; and by Thomas A. Silletto, Vocational Agriculture Instructor, Milford, Iowa, (Committee Chairman).

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Much credit is due the members of a steering committee which met for three sessions in advance of the workshop to determine the areas to be involved and the format to be followed. The following were members of the steering committee:

State Consultant Staff in Career Education - Emeron Dettmann, Jerry Lamers and Elwood Mabon.

ISU Teacher Education Staff - Dr. Harold Crawford, Dr. Bennie Byler, Richard Carter and Dr. Thomas Hoerner.

Vocational Agriculture Instructors - Garland M. Ashbacher, Tom Hensley, G. Leslie Johnson, Lewis Lauterbach, Dennis Lettow, James L. Patton, Thomas A. Silletto, Frederick A. VanLoh and Joe R. White.

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OCCUPATIONAL TITLES

Instructional programs based upon content in this guide will prepare individuals for job entry, will upgrade occupational skills, or will prepare learners for further occupational preparation.

Professional

Research Engineer
Plant-Research Engineer
Field-Research Engineer
Plant-Production Engineer
Research Draftsman

Technical

Assistant Research Engineers
Machinery Designer
Machinery Fieldman

Managerial

General Manager
Sales Manager
Parts Manager
Service Manager
Manager
Assistant Manager
Owner-Manager
Warehouse Manager
Co-Owner-Manager

Supervisory

Shop Foreman
Parts Foreman
Warehouse-Assembly Foreman

Sales

Parts Salesman
Salesman
Truck Salesman
Stock-Control Clerk
Shipping and Receiving Clerk

Office

Clerk
Bookkeeper
Office Secretary
Bookkeeper and Assistant Manager
Office Helper
Accountant

Skilled

Mechanic
Partsman
Welder
Machinist
Bodyman
Mechanic and Truck Driver
Truck Mechanic
Welder-Repairman
Welder-Painter
Bricklayer
Carpenter
Building Contractor
Electrician

Semi-Skilled

Truck Driver
Assemblyman
Shop Worker
Deliveryman
Set-Up and Deliveryman
Mechanic's Helper
Pick-Up Man
Custom Farm Machinery Operator

Unskilled

Common Laborer

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AGRICULTURAL MECHANICS

GENERAL OBJECTIVES

Students completing instruction in agricultural mechanics will become aware of careers in the industry and have developed abilities to:

1. Analyze their interests and future employment opportunities in the industry.
2. Analyze the contribution of agricultural mechanics to the economy of the local community, state and nation.
3. Apply mechanical skills or abilities in the agricultural industry.

UNITS

Opportunities in Agricultural Mechanics
Carpentry and Wood Construction
Concrete and Concrete Masonry
Electricity - Wiring, Controls and Motors
Farmstead Planning, Service Center and Structures
Farm Power and Machinery Operation and Maintenance
Making and Reading Working Drawings
Safety
Storage and Materials Handling
Welding and Metals

Opportunities in Agricultural Mechanics

Problem Areas

- A. Opportunities in agricultural construction
- B. Opportunities in farm power and machinery
- C. Opportunities in agricultural welding
- D. Opportunities related to agricultural mechanics safety
- E. Opportunities in agricultural electrification

Competencies and Learning Activities

A. to E. Opportunities in Agricultural Mechanics

Competencies - students will be able to:

1. Find specific job information in the available career references.
2. Identify job opportunities in agricultural mechanics.
3. Evaluate important factors in job selection.
4. Recognize jobs that correlate directly with their abilities.
5. Choose vocations related to their interest in agricultural mechanics.

Learning activities:

1. Research and report (using guidance office materials) on two vocational areas of interest, including factors of employment and the future outlook of each job.
2. Field trip to agricultural machinery dealership to visit parts, sales, service and management personnel (observe job requirements and discuss jobs with worker).
3. Prepare a collage or exhibit representing job opportunities in agricultural mechanics.

4. Assemble list of factors important in job selection.
5. Field trips to local machine shop, manufacturing company, foundry and electrical sales and service company.

Instructional Aids

1. Vocations in Agriculture - film. ISU Film Library.
2. Careers in Farm Machinery Sales and Services - filmstrip and tape. Vocational Education Productions. California Poly Tech.
3. Machinery Management - Careers Unit, Successful Farming Teacher Service.
4. Career files - high school guidance files.

Carpentry and Wood Construction

Problem Areas

A. Identification and safe use of hand and power tools
B. Lumber characteristics and classifications
C. Selection and use of hardware and glues
D. Roofing materials
E. Roof and rafter construction
F. Building construction
G. Painting and wood preservatives

Competencies and Learning Activities

A. Identification and safe use of hand and power tools

Competencies - students will be able to:

1. Identify the common hand tools.
2. Identify the power tools available.
3. Demonstrate correct use of hand and power tools.
4. Correctly recondition commonly used tools.
5. Correctly adjust or set up power tools for specific jobs.
6. Store tools properly.

Learning activities:

1. Using tool demonstration sheet, students research one hand tool and one power tool and plan demonstrations listing price, parts, adjustments, materials needed, procedure and safe use of tools.
2. Required student project (using hand tools only).
3. Required student project (using power tools only).
4. Recondition shop tools.
5. Set up power tools for use (instructor check before use).
6. Store tools as part of the daily routine cleanup.
7. Participate in FFA agricultural mechanics contest.

B. Lumber characteristics and classifications

Competencies - students will be able to:

1. Identify commonly used kinds of lumber.
2. Classify, select and care for lumber properly.
3. Figure a bill of materials.
4. Calculate the number of board feet and the cost of a project from the price per 1000 board feet.
5. Construct a carpentry project following a sketch or plan.

Learning activities:

1. Discuss the kinds of lumber seen on a field trip to a lumber yard.
2. Make a wood classification display.
3. Decide on a wood project, draw a plan, figure a bill of materials, calculate the board feet, and figure the total cost.
4. Order appropriate materials and store so as to keep from warping during construction of the approved project.

C. Selection and use of hardware and glues

Competencies - students will be able to:

1. Identify types and sizes of bolts, nails and screws.
2. Identify types of hinges and other hardware.
3. Demonstrate the correct use of the types of bolts, nails and and screws.
4. Classify the types of glue according to the characteristics of of the glues.
5. Rank wood fasteners according to holding ability.
6. Demonstrate correct use of glue.

Learning activities:

1. Make a display of the various fasteners, identify and label by type and size.
2. Make a comparison of the various fasteners using individual strength tests (bolts, screws, nails, glue and combinations of the above).
3. Using Elmer's glue, casein glue and resin glue, compare holding abilities in hot water, staining, and costs of use.
4. Conduct a survey in the community to determine the types of glue used in construction.
5. Demonstrate in the agricultural mechanics laboratory the correct usage of the types of fasteners.

D. Roofing materials

Competencies - students will be able to:

1. Identify types of roofing materials.
2. Calculate roofing materials needed for a specific job.
3. Install roofing materials.

Learning activities:

1. Prepare an exhibit or display of roofing materials available.
2. Research advantages and disadvantages of the various types of roofing materials and report to class.
3. Determine the number of squares of shingles needed in repairing a roof.
4. Using a model roof section, demonstrate the use of the roofing materials.
5. Repair a roof using selected roofing materials.

E. Roof and Rafter Construction

Competencies - students will be able to:

1. Identify common roof types.
2. Identify the parts of a roof.

3. Determine the pitch of a roof.
4. Read rafter tables on the framing square.
5. Lay out and saw a common rafter without a tail.
6. Lay out and saw a common rafter with a tail.
7. Lay out and saw jack rafters.

Learning activities:

1. Complete worksheet of roof types.
2. Complete worksheet of roof parts.
3. Calculate pitch, rise per foot of run, length of rafters and related problems.
4. Lay out rafters (use scaled sketch and scaled square on paper).
5. Determine the length of a common rafter and lay out the rafter on a 2 x 4.
6. Prepare an exhibit of rafters and label parts.
7. Construct a truss rafter (glued or nailed gussets).
8. Construct a model roof section for use in shingling and label all parts.

F. Building construction

Competencies - students will be able to:

1. Identify types of buildings commonly constructed in the area.
2. Explain the need for wind resistance and snow load resistance in building construction.
3. Determine the types of doors, roofing materials and floors suitable for a specific building.
4. Determine the loadbearing capacity needed in foundations and wall support.
5. Determine the need for, and proper use of, insulation for livestock buildings.

Learning activities:

1. Field trips to inspect farm buildings of frame or pole construction.
2. Determine snow weight (loadbearing) requirements for zone.
3. Construct types of joints commonly used in building construction.
4. Determine foundation and wall construction needs for specific building sizes and types.
5. Investigate types of doors, floors and roofing possible for given farm construction.
6. Calculate insulation needs, heat loss and supplementary heat needs for farm buildings.

G. Painting and wood preservatives

Competencies - students will be able to:

1. Describe the importance of using quality paint and wood preservatives.
2. Select quality paints.
3. Mix and apply paint correctly, using brushes and rollers, or paint sprayers.
4. Prepare a surface for painting.
5. Select quality paint brushes.
6. Calculate the amount of paint needed for a job.
7. Properly clean and store brushes.

Learning activities:

1. Compare paint can labels as to ingredients, quality of product and price.
2. Observe paint failures and determine the cause.
3. Painting project in community (determine type of paint, amount needed, brushes needed; students choose foreman, set a deadline, and develop a contract for the job).
4. Compare quality paint brushes with "economy" models.
5. Examine old, neglected paint brushes.
6. Determine the amount of surface covering expected from a can of paint (from label).
7. Determine the types of paint that can be applied over old finishes.

Instructional aids

1. Carpentry. Transparency Masters, ISU Ag Engineering Department.
2. Selecting Lumber and Other Building Materials. Illinois Vo-Ag Service.
3. Lumber - Grades and Measurement. Transparency No. WT-11. DCA Educational Products, Inc.
4. Plywood. Transparency No. WT-14. DCA Educational Products.
5. Plywood Facts and Information. Packet. American Plywood Association.
6. ABC of Hand Tools, Parts I and II. Films. General Motors Corp.
7. Hand Tools - Cutting Tools. Film. Universal Education and Visual Arts.
8. Hammers and Screwdrivers, Nails and Screws. Filmstrip. Stanley Tools.
9. Measuring, Testing and Marking Tools. Filmstrip. Stanley Tools.
10. Chisels for Woodworking. Filmstrip. Stanley Tools.
11. Boring Tools for Woodworking. Filmstrip. Stanley Tools.
12. Hand Saws for Woodworking. Filmstrip. Stanley Tools.
13. Basic Curriculum Guide for Production Agriculture in Texas. Texas Education Agency.
14. Basic Core Curriculum. Oklahoma Curriculum and Instructional Materials Center.
15. Tool Identification Kit. The Interstate Printers & Publishers.
16. Power Tool Safety and Operation. Transparency No. 373. Hobar.
17. The Jointer - How to Use it Safely. Illinois Vo-Ag Service. No. 460. Film.
18. Drill Press - How to Use it Safely. Illinois Vo-Ag Service. No. 461. Film.
19. The Circular Saw - How to Use it Safely. Illinois Vo-Ag Service. No. 462. Film.
20. The Power Grinder - How to Use it Safely. Illinois Vo-Ag Service. No. 463. Film.
21. The Radial Arm Saw - How to Use it Safely. Illinois Vo-Ag Service. No. 464. Film.
22. The Portable Electric Saw - How to Use it Safely.- Illinois Vo-Ag Service. No. 465. Film.
23. Occupational Safety and Health Act (safety suggestions).
24. Stanley Safety Charts. Stanley Tools.
25. Nomenclature Chart with Safety Suggestions. Rockwell Manufacturing Company.
26. Hardware Identification Kit. The Interstate Printers & Publishers.

27. Gluing Wood. AED-6. MWPS.
28. Carpentry. Transparency Masters, Agriculture Engineering Department. ISU.
29. Use of the Square in Farm Construction. Booklet. Illinois Vo-Ag Service.
30. Selection and Application of Galvanized Roofing and Siding.
31. Local lumberyard brochures.
32. Farm Utility Buildings. Booklet. Cat. No. 403 AAVIM.
33. Planning Machinery Protection. Booklet. Cat. No. 402 AAVIM.

34. Carpentry. Transparency Master. Iowa State University Agricultural Engineering Department.
35. Truss Rafter Layout. Slides and Cassette. No. 304 Hobar.
36. Nails Catalog. Keystone Steel and Wire Company.

Concrete and Concrete Masonry

Problem Areas

A. Getting acquainted with concrete
B. Portland cement - manufacture, characteristics and types
C. Aggregates for concrete
D. Water for concrete
E. Selection and design of concrete mixtures
F. Quality mixed concrete - ready mix or mix on the job
G. Placing and reinforcing concrete
H. Finishing and curing concrete.
I. Admixtures and special applications of concrete
J. Concrete masonry

Competencies and Learning Activities

A. Getting acquainted with concrete

Competencies - students will be able to:
1. Relate the importance of concrete.
2. Describe the many applications of concrete in farm construction.
3. Define commonly used concrete terms.
4. Explain the composition and properties of a concrete mix.

Learning activities:
1. Compare types of farm construction and advantages of concrete use in home farm construction.
2. Illustrate uses of concrete in the community.
3. Identify tools to be used in the concrete jobs.
4. Compile a list of commonly used concrete terms.
5. Construct a teaching aid showing concrete ingredients.

B. Portland cement - manufacture, characteristics and types

Competencies - students will be able to:
1. Describe the manufacturing process of cement.
2. Calculate the weight and volume of cement needed for a specific job.
3. Choose the correct type of cement needed for given construction jobs.

C. Aggregates for concrete

Competencies - students will be able to:

1. Determine aggregate size by use of sieves.
2. Test aggregates for impurities.
3. Determine the aggregates needed for a given mix.
4. Differentiate between coarse and fine aggregates.
5. Analyze bank-run aggregate for concrete use.
6. Demonstrate a knowledge of possible applications of different kinds of aggregates.

Learning activities:

1. Field trip to sand and gravel company.
2. Prepare a display of types and sizes of aggregates.
3. Test home farm bank-run samples for organic matter and silt content.
4. Demonstrate bulking of sand.
5. Demonstrate a comparison of voids of various sizes and mixed sizes of aggregates.

D. Water for concrete

Competencies - students will be able to:

1. Test water for concrete use.
2. Demonstrate the need for using clean water in mixing concrete.

Learning activities:

1. Examine and compare samples of water from home supplies as well, pond, river or stream for suitability for concrete use.
2. Mix two samples of concrete that are identical except impure water was used in one. Test strength when cured.

E. Selection and design of concrete mixtures

Competencies - students will be able to:

1. Interpret the cement-water ratio.
2. Determine the most economical concrete mixes for specific jobs as indicated by concrete mix tables.
3. Measure a concrete mix slump.
4. Correct the slump of a concrete mix.
5. Determine the yield of a concrete mix.

Learning activities:

1. Demonstrate the effect of varying concentrations of a mix, using Elmer's glue.
2. Prepare samples of different concrete mixes, cure in water, break samples and chart results.
3. Prepare a concrete mix and measure the slump. Correct if necessary.
4. Calculate the yield of a concrete mix, using the rule of thumb or absolute volume method.

F. Quality mixed concrete - ready mix or mix on the job

Competencies - students will be able to:

1. Calculate and compare costs of commercial mix (ready-mix), concrete and home mixed concrete for a given job.

2. Compare advantages of concrete mix sources other than cost.

Learning activities:
1. Secure local prices for aggregates, cement and concrete mix and calculate prices for delivered concrete and for delivered materials.
2. Compare prices using a table and chart showing costs and transportation charges. Find the break-even price.
3. Field trip to a ready-mix plant.

G. Placing and reinforcing concrete

Competencies - students will be able to:
1. Describe the characteristics of a good concrete form.
2. Prepare a form for use by oiling and installing ties and spacers.
3. Place concrete in a form correctly.
4. Select correct reinforcing materials to be used.
5. Install reinforcement materials as concrete is placed in the forms.

Learning activities:
1. Prepare a chart which shows desirable characteristics of a concrete form.
2. Demonstrate removal of an oiled form and an unoiled form.
3. Prepare a display of concrete reinforcing materials.
4. Demonstrate correct and incorrect placement of reinforcement and compare the relative strength of the samples.

H. Finishing and curing concrete

Competencies - students will be able to:
1. Identify and use concrete finishing tools.
2. Determine when concrete is ready to finish.
3. Achieve a desired finish on concrete.
4. Cure concrete correctly.
5. Demonstrate the importance of correct concrete curing.

Learning activities:
1. Prepare concrete samples and compare strengths of samples cured in air, water and by freezing.
2. Mix, place and finish patio blocks or sidewalk using float, trowel, edger and jointer.
3. Develop several means of placing a design on concrete work.
4. Correctly cure concrete construction.
5. Construct and cure patio blocks, drain splash blocks, hog troughs, grill, bird bath or other small construction.
6. Construct and cure sidewalk, drive, garage floor or other large project.
7. Construct farm and home improvement projects, using concrete and other construction materials.

I. Admixtures and special applications of concrete

Competencies - students will be able to:
1. Explain how concrete may be treated to meet special job requirements, such as to reduce weight, decrease curing time,

increase water resistance, or increase acid resistance.
2. Color concrete using sprinkle, topping or complete mix method.
3. Apply principles involving pre- and post-stressed concrete in agricultural construction.
4. Demonstrate applications of tilt-up concrete farm construction.

Learning activities:
1. Research admixtures and prepare an exhibit of the use of each.
2. Color concrete project using the three methods.
3. Demonstrate pre- and post-stressing of concrete.
4. Plan a concrete construction using tilt-up concrete.
5. Prepare a display of concrete coloring materials and costs of each.

J. Concrete masonry

Competencies - students will be able to:
1. Estimate materials needed for masonry construction.
2. Describe the dimensions of bricks and blocks.
3. Correctly mix mortar.
4. Apply correct procedures in masonry construction.

Learning activities:
1. Lay two courses of blocks or bricks without mortar to check layout.
2. Construct a wall corner using mortar and bricks.
3. Construct a foundation for a garage.
4. Construct a fireplace or grill.
5. Prepare a bill of materials for masonry construction.
6. Inspect an existing masonry construction for faults.
7. Field trip to a block or brick construction site, or building construction supply.
8. Sketch and label parts of a masonry wall.
9. Demonstrate procedures for installing anchor bolts and intersecting nonbearing walls, foundation walls, cavity walls, block backup, expansion joints and for tooling joints.

Instructional Aids
1. Principles of Quality Concrete. Film. Iowa State University Media Resources Center.
2. Selecting, Proportioning and Mixing Materials for Quality Concrete. Filmstrip and Narration. IVATA.
3. Placing, Finishing and Curing Concrete Slabs. Filmstrip and Narration. IVATA.
4. Laying Concrete Masonry. Filmstrip and Narration. IVATA.
5. Concrete Technology - Instructor's Guide. Delmar Publisher.
6. Building Concrete Farm Structures. Portland Cement Association.
7. Cement Mason's Manual. Portland Cement Association.
8. Pave Your Barnyard with Concrete. Portland Cement Association.
9. Making Quality Concrete for Farm Construction. Portland Cement Association.
10. Concrete Improvements for Farm and Ranch. Portland Cement Association.

11. Recommended Practices for Building with Concrete Masonry. Pamphlet No. 3034. Illinois Vo-Ag Service.
12. Making and Using Concrete on the Farm. Pamphlet No. 3007. Illinois Vo-Ag Service.
13. Use of Concrete on the Farm. Bulletin No. 2203 USDA.
14. Ready-Mixed Concrete for the Farm. Portland Cement Association.
15. Basic Curriculum Guide for Production Agriculture in Texas. Texas Education Agency.

Electricity - Wiring, Controls and Motors

Problem Areas

- A. The importance of electricity
- B. Understanding electrical terms and measurement
- C. Principles of wiring, switches and circuits
- D. Selecting wire types and sizes
- E. Electrical overcurrent devices
- F. Types of electrical systems
- G. Identification and selection of electric motors
- H. Electric motor care
- I. Control systems for electric motors

Competencies and Learning Activities

A. The importance of electricity

Competencies - students will be able to:

1. Describe the many uses and benefits of electricity.
2. Compare electricity to alternate sources of power.
3. Explain how quality standards are established.

Learning activities:

1. Compile a list of electricity uses on the home farm.
2. Compare advantages and disadvantages of electric and other available power sources.
3. Take field trip to power plant.
4. Include electrical safety inspection in local FFA sponsored safety check.
5. Estimate number of students needed to match work of motor. (a 1/4 hp motor will do the following per 10 hour day:
    - a. pump 3000 gal. water or,
    - b. move 1000 bu. grain or,
    - c. shell 240 bu. of corn)
6. Investigate the use of Underwriters Laboratory labels of approval.
7. Determine what local electrical codes have been established.

B. Principles of wiring, switches and circuits

Competencies - students will be able to:

1. Explain how electricity is distributed.
2. Identify and explain the functions of the components.
3. Differentiate between parallel and series circuits.

4. Identify commonly used electrical supplies.
5. Identify and be able to use tools commonly used in electrical installations.

Learning activities:

1. Lay out a common electrical circuit and label all of its parts.
2. Explain how a circuit works.
3. Do various wiring jobs.
4. Demonstrate parallel and series circuits on a wiring board.
5. Identify complete wiring jobs related to home farm projects or enterprises.
6. Demonstrate and explain installation of 2-way, 3-way and 4-way switches.

C. Understanding electrical terms and measurement

Competencies - students will be able to:

1. Correctly use common electrical terms.
2. Correctly read the watt-hour meter.
3. Explain how electricity is measured.
4. Calculate an electric bill.

Learning activities:

1. Identify and define common electrical terms.
2. Attach a watt-hour meter to a piece of equipment and figure cost of operation per 24 hour day.
3. Compute amount of electricity used on the home farm and figure its cost.
4. Examine an electric bill, or statement and explain how it was computed.

D. Selecting wire types and sizes

Competencies - students will be able to:

1. Identify the common wire types and sizes.
2. Correctly determine wire load carrying capacity.
3. Correctly make various wire splices.
4. Select wire of proper size and proper materials for a job.
5. Correctly use wire size chart.
6. Explain the significance of voltage drop.

Learning activities:

1. Make a display board using various wire sizes and types (indicate uses and capacities for a given wire length).
2. Determine the correct wire type and size required by the National Electrical Code for an installation on the home farm.
3. Make simple wire connections by the use of solder and tape, and connectors.
4. Select and secure wire to be installed on home farm.

E. Electrical overcurrent devices

Competencies - students will be able to:

1. Identify common fuses and circuit brakers.
2. Select correct overcurrent devices for installation.

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3. Explain the function of the common overcurrent devices.
4. Know the specialized purpose of overcurrent devices in a circuit.

Learning activities
1. Prepare a display of overcurrent devices.
2. Select fuses and/or circuit breakers for home farm installation.
3. Demonstrate the results of installation of incorrect overcurrent devices.
4. Demonstrate the use of nontamperable fustats.
5. Demonstrate and compare use of a fustron and common fuses for electric motors.

F. Types of electrical systems

Competencies - students will be able to:
1. Identify common wiring systems for farms and residences.
2. Install or repair electrical circuits using the common systems.
3. Determine local requirements or customs of installation.
4. Select a type of cable or conduit for a specific installation.

Learning activities:
1. Field trip to a construction site.
2. Demonstrate how a conduit will carry current.
3. Install a selected system in a home farm construction.
4. Demonstrate the need for current ground connections.
5. Demonstrate use of a conduit bender.

G. Identification and selection of electric motors

Competencies - students will be able to:
1. Identify types of electric motors.
2. Describe characteristics of the types of motors.
3. Diagram the parts of electric motors.
4. Read and comprehend the information supplied on motor nameplates.
5. Select an electric motor for a given job or situation.
6. Change a motor from low voltage to high voltage or the reverse, when applicable.
7. Determine the speed of a motor given the number of pairs of poles in its field.
8. Determine pulley sizes needed to meet specific machine speed requirements.
9. Diagram the circuits of common motors.
10. Reverse rotation of electric motors.

Learning activities:
1. Complete a work or skill sheet on electric motor nameplates.
2. Secure representative types of motors, disassemble and examine parts.
3. Measure starting torque and compare electricity used by motors (voltage, amperes and watts).

4. Demonstrate voltage change and reversing rotation of motors.
5. Demonstrate changing rotation speeds by selection of pulley sizes.

H. Electric motor care

Competencies - students will be able to:
1. Lubricate electric motors correctly.
2. Clean electric motors correctly.
3. Explain why electric motors should be kept clean.
4. Demonstrate the result of excess lubrication of electric motors.
5. Disassemble, clean and reassemble motors.

Learning activities:
1. Examine burned out or faulty electric motors for probable causes of failure.
2. Field trip to farm feed handling facility or elevator to observe motor installation and care.
3. Secure home farm motors for cleaning.
4. Compare efficiency of motors before and after cleaning.
5. Survey community for use of motors.
6. Establish and carry out a motor maintenance schedule on home farm.
7. FFA demonstration on motor care.

I. Control systems for electric motors

Competencies - students will be able to:
1. Describe the trend in use of electric controls for motors.
2. Illustrate several applications of motor controls in agriculture.
3. Identify common motor controls.
4. Install controls for motors in circuits.
5. Explain advantages of the use of electric motor controls for agricultural use.

Learning activities:
1. Field trip to cattle feeding operation using automated motor controls.
2. Survey community to determine applications of motor controls.
3. Secure motor controls and demonstrate use of each.
4. Develop a plan and sketch operation of controls.
5. FFA demonstration in agricultural mechanics using applications of electric motor controls.
6. Install sprinkler system controlled by time clock for horticulture class.
7. Install buzzer system for shop cleanup time.

Instructional Aids
1. Principles of Electricity, Film, General Electric.
2. Electricity-Production, Film, Indiana Audio Visual Center.
3. Electric Circuits, Filmstrip, Popular Science Publishing Co.
4. Farm Lighting, F2243, USDA.
5. Single-Phase Electric Motors for Farm Use, F2177, USDA.
6. Understanding Electricity and Electric Terms, Slide Set No. S303, AAVIM.

7. Electric Motors — Selection-Protection-Drives, Slides No. S302, AAFIM.
8. Maintaining the Lighting and Wiring System, Transparency and/or Transparency Master Nos. M301 and T301, AAVIM.
9. Aids for Planning Mechanized Feeding, Booklet, North Dakota Extension Service.
10. Understanding Electricity and Electrical Terms, Manual No. 30, AAVIM.
11. Electric Motors -- Selection-Protection-Drives, Transparency Masters No. M302, AAVIM.
12. Maintaining the Lighting and Wiring System, No. 301, AAVIM.
13. Electrical Wiring, Booklet, Sears Roebuck & Company.
14. Answer to Common Electric Motor Problems, Booklet, Dayton Electric Mfg. Co.
15. Electric Motors, Bulletin No. 6117, Lincoln Electric Company.
16. Electric Motors, Booklet No. 302, AAVIM.
17. Controls for Automation in Agriculture, Teachers Unit Plan, Penn. State University.
18. Suggestions for Teaching Electrical and Basic Controls Used in Agricultural Production, Edison Electric Institute.
19. Automatic Controls, Transparency Masters, Iowa State University, Agricultural Engineering Department.
20. Electric Motors, Transparency Masters, Iowa State University, Agricultural Engineering Department.

Farmstead Planning, Service Center and Structures

Problem Areas

A. Planning the farmstead arrangement
B. Farmstead renovation
C. Planning the farm service center
D. Planning farmstead structures
E. Planning farm soil structures
F. Planning pollution control structures
G. Fences
H. Building materials (Refer to Carpentry and Wood Construction and Concrete and Concrete Masonry units in this guide)

Competencies and Learning Activities

A. Planning the farmstead arrangement

Competencies - students will be able to:

1. Illustrate the principles of farmstead planning.
2. Apply the principles of farmstead planning in solving specific farm problems.

Learning activities:

1. Plan and sketch a farmstead with given buildings and enterprises.
2. Build a model topographical site and develop a farmstead on the site model.
3. Field trip to a well organized farmstead.
4. Field trip to a planned farmstead construction.

B. Farmstead renovation

Competencies - students will be able to:
1. Recognize needed building repair on the home farm.
2. Formulate plans for remodeling existing buildings.
3. Plan windbreak plantings for the farmstead.
4. Appraise present building layout and determine needed changes to fit the changing farm operation.
5. Make final construction plans.

Learning activities:
1. Field trip to students' home farms and list possible needed improvements.
2. Field trip to observe and assist in windbreak plantings.
3. FFA chapter project to plant windbreaks.
4. Plan changes in a farmstead layout to meet needs of enterprise changes.

C. Planning the farm service center

Competencies - students will be able to:
1. Determine the need for a service center on the farm.
2. Outline the activities to be handled at the service center.
3. Relate the service center activities to space requirements and building design.
4. Determine equipment and tools to be obtained for the service center.

Learning activities:
1. Field trip to well planned farm service center.
2. Plan remodeling of a farm structure including equipment and tool storage arrangement.
3. Design a farm service center to meet specific needs.
4. Plan tool storage arrangement for an existing farm shop.
5. Calculate the cost of tools and equipment for the farm service center.

D. Planning farmstead structures

Competencies - students will be able to:
1. Determine the sizes of structures needed for specific enterprises as related to capacity for livestock and feeds.
2. Determine the type of building best suited for specific purposes.
3. Recognize the need for a versatile structure.
4. Apply principles of construction related to location and direction.
5. Summarize current recommendations for farm structures.

Learning activities:
1. Field trip to local farms with new structures.
2. Determine the space requirements for given amounts of livestock and feed.
3. Determine the type of roof needed. (load carrying capacity for area)

4. Students plan structures to fit farmstead plan (given size of enterprises).

E. Planning farm soil structures

Competencies - students will be able to:
1. Recognize the need for farm soil structures.
2. Secure help in planning farm soil structures.
3. Incorporate plans for soil structures in overall farmstead, conservation or pollution control planning.
4. Secure plans and specifications for soil structures.
5. Describe standards established regarding the construction of soil structures.
6. Use a transit - level.

Learning activities:
1. Field trip to inspect soil structures for conservation or livestock enterprise use.
2. Resource soil conservation personnel explain soil structure standards, legal requirements, and related factors.
3. Field trip to observe planning and development of a soil structure.
4. Plan and lay out soil structure.
5. Develop model topographical layout incorporating soil structures.
6. FFA community demonstration of soil loss from potential pollution or conservation control area and controlled area.
7. FFA assist in planning and development of school athletic or other soil structure related project.
8. Determine the rise or fall of the football field at each ten yard marker above or below each goal line.

F. Planning pollution control structures

Competencies - students will be able to:
1. Design several types of pollution control structures applicable to livestock production.
2. Determine the need for pollution control structures.
3. Know trends in pollution control structure construction.
4. Obtain pollution control information.
5. Recognize areas or situations needing pollution controls.

Learning activities:
1. Given a situation, design a pollution control structure.
2. Field trip to observe area pollution problems.
3. Survey community and determine pollution problems (including odor).
4. FFA conduct well and stream tests for pollution. (cooperate with Science Club)
5. Construct model lagoon, and slotted floor construction of livestock building.
6. Research anaerobic and aerobic lagoon design and report to class.
7. Secure samples of fluids from lagoons and analyze.

G. Fences

Competencies - students will be able to:

1. Describe common materials used in fencing.
2. Outline types of fences used in livestock production.
3. Calculate material cost for fence construction.
4. Explain and demonstrate types of bracing and corner construction used in fencing.
5. Design and construct cattle guard gates.
6. Construct board, barbed wire, or woven wire fences.
7. Demonstrate safe use of fencing tools.
8. Follow plans for livestock holding, sorting and loading facilities correctly.
9. Construct a temporary fence for livestock.

Learning activities:

1. Secure local costs of fencing materials.
2. Calculate costs per rod of different types of fences.
3. Compare advantages and disadvantages of types of fences for the different livestock.
4. Construct fences for home farm enterprises or student project.
5. Construct temporary electric fence for student livestock project. (protect FFA chapter sweet corn from raccoons)
6. Construct display of fencing materials.

Instructional Aids

1. Irrigation and the Business of Farming, Film, Farm Film Foundation.
2. The Pageant of the American Farms, Film, ISU Media Resources.
3. Structures and Environment, Transparency Masters, MWPS.
4. Planning a Farm Shop Layout, Filmstrip, AAVIM.
5. Trends in Livestock Buildings, Booklet FS1066, ISU Extension Service.
6. Weather Protection For Feedlot Cattle, Booklet FS1235, ISU Extension Service.
7. Bin Drying Shelled Corn, Booklet PM313, ISU Extension Service.
8. Corn Storage-How and Where, Booklet PM319, ISU Extension Service.
9. Batch and Continuous Dryers for Shelled Corn, Booklet PM382, ISU Extension Service.
10. Ventilate Your Dairy Barn, Booklet PM468, ISU Extension Service.
11. Grain Storage Building, Booklet No. 6039, USDA.
12. Foundations For Farm Buildings, Booklet F1869, USDA.
13. Calf Barn Open Front Pen Type, Booklet No. 5970, USDA.
14. Farrowing and Growing Building For Hogs, Booklet No. 6032, USDA.
15. Farrowing House For Hogs, Booklet No. 6088, USDA.
16. Free Stall Barn For Cattle, Booklet No. 6050, USDA.
17. Free Stall Barn For Dairy Cattle, Booklet No. 6067, USDA.
18. Hay Storage and Feeding Shed, Booklet, USDA.
19. Beef Confinement, Booklet, Iowa Development Comm. Research Div.
20. Storage Sheds, Booklet No. 6086 and No. 6093, USDA.
21. Structures and Environment Handbook, No. 1, MWPS.
22. Planning Your Farm Service Center, ISU Extension Service.

Farm Power and Machinery Operation and Maintenance

Problem Areas

- A. Small gas engines
- B. Cooling systems
- C. Fuel
- D. Ignition
- E. Lubrication
- F. Measuring devices
- G. Transmission of power
- H. Primary tillage equipment
- I. Secondary tillage equipment
- J. Row crop planting equipment
- K. Seeding equipment
- L. Grain harvesting
- M. Forage harvesting

Competencies and Learning Activities

A. Small gas engines

Competencies - students will be able to:

1. Explain principles of operation.
2. Disassemble and reassemble small gas engines.
3. Describe factors and engine components involved in compression.
4. Explain factors and engine components involved in ignition.
5. Describe factors and engine components involved in carburetion.
6. 'Trouble shoot' small gas engines.
7. Illustrate preventative maintenance and storage instructions.
8. Identify small engine parts and tools.
9. Use small engine tools, measuring and test equipment.

Learning activities:

1. Disassemble and reassemble small gas engines observing guide sheet directions.
2. Prepare a cut-away engine for class use.
3. Sketch valve positions and piston direction of travel using a work sheet indicating cycle and piston position.
4. Compute displacement of an engine.
5. Calculate horsepower output of an engine at a given RPM.
6. Identify the parts of a small gas engine.
7. Start an engine which has intentionally been incorrectly adjusted.
8. Identify small engine parts and tools placed at stations in the shop.

B. Cooling systems

Competencies - students will be able to:

1. Describe the importance of the cooling system.
2. Identify the processes involved in a liquid cooling system.
3. Locate the parts of the cooling system and describe their functions.
4. Measure the thermal protection level of the antifreeze.

Learning activities:

1. Calculate the BTU's dissipated from the radiator of a given size tractor.
2. Discuss the processes involved in a cooling system.
3. Identify parts of a cooling system using a guide sheet.
4. Check antifreeze protection of the coolant.
5. Discuss the functions of the individual parts of a cooling system.
6. Perform checks on the cooling system, as called for in the owners manual.
7. Check the function of a thermostat.

C. Fuel

Competencies - students will be able to:

1. Identify kind of engine on the basis of their fuel use.
2. Diagram the complete fuel system of a tractor or power unit.
3. Identify the parts of a carburetor or injection system.
4. Explain the functions of the carburetor and injection system parts.
5. Explain the characteristics of fuels.
6. Correctly maintain the fuel system.

Learning activities:

1. Compare gas, diesel, and LP engine characteristics.
2. Diagram the fuel system of a tractor or power unit.
3. Complete skill sheet on carburetor parts identification.
4. Research and do a written report on the parts and functions of a carburetor or injection system.
5. Adjust idle speed, air fuel mixture settings, and be prepared to explain the procedure to the class.
6. Compare fuels by weight, color, smell, and discuss burning characteristics.
7. Set the carburetor adjustment of a tractor loaded by a dynamometer.
8. Measure fuel consumption by use of a fuel-flow meter.
9. Examine plugged fuel filters.

D. Ignition

Competencies - student will be able to:

1. Identify the parts of a battery-powered ignition system, and a magneto ignition system.
2. Describe the principles of ignition.
3. Distinguish between the ignition system of gas and diesel engines.
4. Perform ignition trouble shooting procedures.
5. Demonstrate the importance of correct engine timing.
6. Describe the function of the battery and of the importance of correct battery maintenance.
7. Apply learned principles on the home farm.

Learning activities:

1. Make a chart showing the two electrical circuits, and label all of the parts.

2. Construct a model tractor ignition system using actual working parts to show sequence of firing of spark plugs.
3. Discuss the principles of ignition after viewing a film on ignition systems.
4. Compare gas and diesel engines in the shop.
5. Trouble shoot ignition problems with tune-up and test equipment.
6. Construct a model battery.
7. Measure battery charge level.
8. Adjust a tractor ignition by using a dynamometer to load the tractor.
9. Check fuel consumption of a correctly adjusted tractor.

E. Lubrication

Competencies - student will be able to:
1. Explain the importance of proper lubrication.
2. Identify lubrication interval for each of the lubrication points.
3. Distinguish the different types of lubrication and filters.
4. Locate and identify points of lubrication.
5. Evaluate the grades of oil and greases.
6. Store lubricants properly.
7. Lubricate home farm machines according to a lubrication and maintenance chart.

Learning activities:
1. Illustrate engine problems caused by lack of lubrication.
2. Change the oil of a tractor or power unit.
3. Make a lubrication chart for a farm tractor and keep it up-to-date.
4. Perform complete lubrication of a tractor as indicated in operators manual.
5. Compare different types of oil filters for quality and endurance.
6. Bring in various types and grades of oil and demonstrate the viscosity (use corked test tubes and small steel bearings).
7. Pack a bearing.
8. Perform periodic service checks according to owners manual.
9. Compare full flow versus bypass filtration system.
10. Evaluate safe lubricant storage.
11. Observe machine or tractor damage due to improper lubrication.

F. Measuring devices

Competencies - student will be able to:
1. Use the following measuring and testing devices:
   - a) Amp. tester
   - b) Calipers
   - c) Dwell tachometer
   - d) Dynamometer
   - e) Feeler gage
   - f) Micrometer
   - g) Ohm. meter
   - h) Plastigage
   - i) Spark plug gage

- j) Spark plug cleaner and tester
- k) Torque wrench
- l) Voltage tester
- m) Hydromoter

Learning activities:

1. Set up measuring work stations and have manuals available for reference.
2. Conduct measuring devices contest.
3. FFA members conduct a tractor tune-up day.

G. Transmission of power

Competencies - students will be able to:

1. Check and adjust clearance in the clutch linkage.
2. Identify various types of transmissions.
3. Identify PTO drive systems.
4. Differentiate between types of hydraulic systems.
5. Identify the type of power steering mechanism.
6. Determine wheel RPM ratio in comparison to engine RPM.
7. Identify the type of brake system on a tractor.
8. Compare differences in tractor tires.

Learning activities:

1. Adjust clearance in the clutch linkage.
2. Inspect each of the following transmissions:
   - a) Selective gear
   - b) Constant-engagement, underdrive
   - c) Hydraulic torque converter
   - d) Planetary gear
   - e) Hydrostatic drive
3. Inspect each of the following power take-off systems:
   - a) Transmission driven
   - b) Continuous running
   - c) Independent
4. Compare the single acting and double acting hydraulic systems.
5. Compare the booster system of power steering and the hydraulic cylinder in the steering drag line.
6. Perform maintenance on the various types of brake systems.
7. Compare gear ratios on various tractors and power units.
8. Use cut-aways of several old tires, and point out the plies, rated load, and grades of tires.
9. Disassemble and repair hydraulic cylinders.
10. Measure tractor slippage.
11. Disassemble and inspect a tractor power train.
12. Construct a model hydraulic system including cylinders and remote hydraulic motor.
13. Survey community to determine extent of use of hydraulics in farm operations.

H. Primary tillage equipment

Competencies - students will be able to:

1. Identify sizes and types of primary tillage equipment.
2. Describe the uses of primary tillage equipment.
3. Operate, adjust, and maintain tillage equipment common to the area.

4. Determine tractor horsepower as related to tillage equipment used.
5. Make field adjustments.

Learning activities:

1. Assemble primary tillage equipment.
2. Study the owners manual for proper adjustments and maintenance.
3. Visit the implement dealer's machinery lot and become acquainted with his primary tillage equipment line.
4. Perform various tillage operations on FFA test plot or on student's farm.
5. Adjust tillage machines in operation on the home farm.
6. Complete needed repairs on tillage machines.

I. Secondary tillage equipment

Competencies - students will be able to:

1. Identify sizes and types of secondary equipment.
2. Explain the uses of secondary tillage equipment.
3. Operate, adjust, and maintain equipment according to owners manual.
4. Make field adjustments.

Learning activities:

1. Study charts and owners manual on the tillage equipment used in the area.
2. Assemble various equipment.
3. Adjust equipment to proper running depths and row widths.
4. Determine tractor horsepower needed for equipment size and operating speed.
5. Perform maintenance jobs on equipment.

J. Row-crop planting equipment.

Competencies - students will be able to:

1. Identify sizes and types of planters.
2. Perform proper calibration of planters.
3. Perform correct maintenance.
4. Operate the planter properly.
5. Make field adjustments.

Learning activities:

1. Collect planter materials from all the local dealers and make comparisons.
2. Assemble a row-crop planter.
3. Calibrate the planter for various populations.
4. Perform maintenance on used planters.
5. Operate planter on FFA test plot and make field adjustments.

K. Seeding equipment

Competencies - students will be able to:

1. Identify sizes and types of seeding equipment.
2. Calibrate equipment
3. Follow proper maintenance procedures.
4. Make proper field adjustments.

Learning activities:

1. Collect seeding equipment materials from the local dealers and compare them.
2. Assemble seeding equipment.
3. Calibrate a seeder for various populations and types of seeds.
4. Use operators manual and perform maintenance.
5. Demonstrate field adjustments and show effects of different settings.
6. Observe adjustment tables and compare seed output with specified amounts on tables.

L. Grain harvesting

Competencies - students will be able to:

1. Classify equipment as to size and use.
2. Perform proper adjustment of the various mechanisms of the harvesting equipment.
3. Calculate harvest losses.
4. Perform field adjustments.
5. Figure size of equipment needed.

Learning activities:

1. Visit implement dealer's lot and view his line of grain harvesting equipment.
2. Adjust the machine for various grains according to owners manual.
3. Determine field losses.
4. Perform field adjustments.
5. Repair and maintain grain harvesting equipment.
6. Set up new or used machine for field operations.
7. Assemble harvesting machine components.

M. Forage harvesting

Competencies - students will be able to:

1. Select proper size of machine for operation.
2. Properly classify equipment by type, size, and power required.
3. Perform maintenance on various equipment.
4. Adjust forage harvesting equipment used in the area.
5. Determine the horsepower needed for various harvesting operations.

Learning activities:

1. Visit various operations to observe different methods of havesting forage.
2. Write a report on forage harvesting equipment comparing the forage equipment line of two local implement dealers by type, size, and power required to operate.
3. Repair and maintain forage harvesting equipment.
4. Operate forage harvesting equipment on test plot or home farm, and make field adjustments.
5. Become familiar with owners manual.
6. Assemble equipment for local implement dealer.

Instructional Aids

1. Small Gasoline Engines, No. 108 and No. 109, AAVIM.

2. Operation and Care of Hydraulic Machinery, Texaco, Inc.
3. Combines and Combining, Ohio Agricultural Education Service.
4. Individual Study Guide on Carburetion, Ohio Agricultural Education Service.
5. Plows and Plowing, Ohio Agricultural Education Service.
6. Corn Pickers and Picking Corn, Ohio Agricultural Education Service.
7. Equipment and Calibration Spray Applicator's Guide, Geigy Chemical.
8. Individual Study Guide on Electrical Systems for Spark-Ignition Engines, Ohio Agricultural Education Service.
9. A. C. Spark Plug Catalog, A. C. Spark Plug.
10. The Storage Battery, No. 3024, Illinois Vo-Ag Service.
11. Engine Compression and Cylinder Leakage Testing, No. 3025, Illinois Vo-Ag Service.
12. The Spark Plug-Operation, Selection and Maintenance, No. 3026, Illinois Vo-Ag Service.
13. The Ignition System-Testing and Analyzing Test Results, No. 3028, Illinois Vo-Ag Service.
14. The Engine Cooling System, No. 3030, Illinois Vo-Ag Service.
15. Tires for Farm Equipment, No. 3031, Illinois Vo-Ag Service.
16. Electrical Fundamentals Useful in Engine Analysis, No. 3032, Illinois Vo-Ag Service.
17. Fitting Machinery and Equipment to the Farm, No. 3039, Illinois Vo-Ag Service.
18. Combine Service, Repair and Maintenance, Minnesota Agricultural Engineering Department.
19. Plows and Plowing, Minnesota Agricultural Engineering Dept.
20. Hay Baler Service, Repair and Maintenance, Minnesota Agricultural Engineering Department.
21. Corn Planter Service, Repair and Maintenance (Plate and Plateless), Minnesota Agricultural Engineering Department.
22. Micrometers and Related Measuring Tools, No. 3023, Illinois Vo-Ag Service.
23. Operating Farm Tractors and Machines Efficiently, PM450, ISU Extension Service.
24. Small Engines, Repair and Overhaul, Illinois Vo-Ag Service.
25. The Two-Cycle Engine, Illinois Vo-Ag Service.
26. The Tractor Electrical System, No. 107, AAVIM.
27. Tractor Operation and Daily Care, No. 103, AAVIM.
28. Farm Tractor Tune-Up and Service Specifications, No. 101, AAVIM.
29. Understanding and Measuring Horsepower, No. 902, AAVIM.
30. Tractor Maintenance, No. 104, AAVIM.
31. Tractor Transmissions, No. 106, AAVIM.
32. Ball and Roller Bearings, No. 901, AAVIM.
33. Farm Machinery Operation (Safety Packet), Iowa Farm Bureau.
34. Torque and Torque Wrenches, Hobar.
35. Torque and Torque Wrench (Tool Kit), Hobar.
36. Magneto Ignition Kit, Hobar.
37. Micrometer Calipers and Gauges, Hobar.
38. Tractor Safety Packet, International Harvester Company.
39. All About Small Engines, Goodheart-Wilcox.
40. Horsesense for Horsepower, Film, NC. 1449, ISU Media Resource.
41. Hydraulic Controls, Film, NS0392, ISU Media Resource.
42. Complete Overhaul, Slides, Briggs and Stratton.
43. Case of the Missing Horses, Film, Ford Motor Company.

44. Longer Life in Corn Planters, Film, Cornell Film Library.
45. ABC of the Diesel Engine, Film, General Motors Film Library.
46. Combustion in Action, Film, General Motors Film Library.
47. Basic Hydraulics, International Harvestor.
48. Small Gas Engine, Transparency Masters, ISU Agricultural Engineering Department.
49. Skill Sheets for Small Gas Engines, ISU Agricultural Engineering Department.
50. More From Less, Film, (Progress Report on No-Tillage), ISU Media Resource.
51. Field Sprayer Calibration, Slide Film, Illinois Vo-Ag Service.
52. Live Power Harvest, Film, ISU Media Resources.
53. Zero Tillage: Why It's Catching On, Film, John Deere Film Library.
54. Is Remote-Controlled Farm Operation in Your Future? Film, John Deere Film Library.
55. Check Points For Better Spraying, Film, John Deere Film Library.
56. What You Should Know About Farm Tires, B.F. Goodrich.
57. Agricultural Machinery, Transparency Masters, ISU Agricultural Engineering Department.
58. Field Sprayer Calibration, Transparency Masters, ISU Agricultural Engineering Department.

Making and Reading Working Drawings

Problem Areas

A. Instruments and equipment
B. Techniques of drafting
C. Lettering
D. Blueprints

Competencies and Learning Activities

A. Instruments and equipment

Competencies - students will be able to:
1. Identify drafting tools.
2. Correctly use drafting tools.

Learning activities:
1. Practice drawing basic lines.
2. Observe and identify types of lines shown on blueprints.

B. Techniques of drafting

Competencies - students will be able to:
1. Identify orthographical views.
2. Correctly reproduce orthographical views.
3. Correctly sketch plans for projects.

Learning activities:
1. Practice drawing the types of orthographical views of drawings.
2. Draw orthographical views of objects.
3. Sketch plans for shop projects.

C. Lettering

Competencies - students will be able to:
1. Identify common lettering styles.
2. Reproduce Gothic lettering.

Learning activities:
1. Prepare a display of types of lettering styles.
2. Practice lettering using the Gothic style.
3. Prepare charts and posters for FFA projects.

D. Blueprints

Competencies - students will be able to:
1. Read blueprints.
2. Reproduce blueprints for projects.

Learning activities:
1. Secure and explain the use of blueprints.
2. Compare workmanship with the blueprints (school facilities).
3. Construct a project following the specifications given on a blueprint.
4. Identify common blueprint symbols.

Instructional Aids
1. Oklahoma Basic Core Curriculum, Oklahoma State Board of Vocational and Technical Education.
2. Texas Basic Curriculum Guide For Production Agriculture, Texas Education Agency.

Safety

Problem Areas
- A. Farm fire protection planning
- B. Flammable liquids and gases
- C. Chemical equipment usage
- D. Shop safety
- E. Tractor and machinery operation
- F. Electrical safety
- G. General farm safety

Competencies and Learning Activities

A. Farm fire protection planning

Competencies - students will be able to:
1. Explain the importance of proper fire safety.
2. Describe potential fire hazards
3. Differentiate between types of fire extinguishers.
4. Demonstrate the correct use of all available types of fire extinguishers.

Learning activities:
1. Fire fighting demonstration by local fire department during Farm Safety Week.
2. Hold farm safety check (FFA Project).

3. Compare the types of fire extinguishers according to use.
4. Research and report on farm fires (emphasize cost and causes).

B. Flammable liquids and gasses

Competencies - students will be able to:
1. Safely handle, store and use flammable liquids and gases.
2. Identify characteristics of flammable liquids and gases, and explain how to extinguish them.
3. Classify and describe flammable liquids.

Learning activities:
1. Determine proper methods of storing, handling, using and extinguishing flammable liquids; be ready to lead class discussion on any one of the areas.
2. Explain characteristics of the different flammable liquids and gases.
3. Demonstrate flammability of fuels (use small crucible).

C. Chemical Usage

Competencies - students will be able to:
1. Classify agricultural chemicals.
2. Explain correct procedure for application.
3. Identify symptoms of toxicity.
4. Identify alternatives to using chemicals.
5. Read and follow labels on chemical containers.
6. Apply first aid for chemical poisoning.

Learning activities:
1. Make a chart showing classification and usage of chemicals.
2. Visit a chemical dealer, discuss equipment, chemical rates, and specific usage of various agriculture chemicals.
3. Prepare a paper on alternatives to using chemicals.
4. Review laws restricting usage of chemicals and be prepared to lead discussion.
5. FFA demonstrate chemical usage to farmers.

D. Shop safety

Competencies - students will be able to:
1. Demonstrate how safety precautions should be observed in using hand and power tools.
2. Identify general precautions to be observed when handling and moving objects.
3. Prevent falls.
4. Identify sources that could cause accidents from fumes and gases.
5. Provide first aid and take other action when an accident occurs.

Learning activities:
1. Inventory home farm for safety hazards, and correct them.
2. Practice safe hand and power tool use. Complete test on safety procedures.

3. Properly lift objects in class. Discuss observations. Use P.E. instructor.
4. Check shop area for exhaust fans or ducts when running engines.
5. Demonstrate general first aid. (Could be directed by school nurse.)

E. Tractor and machinery operation

Competencies - students will be able to:

1. Provide daily maintenance and safety checks.
2. Start and stop tractors and machines correctly.
3. Read the instrument panel.
4. Use tractor and machinery controls correctly.
5. Practice tractor safety on the farm and road.
6. Use correctly the hitch, the PTO and hydraulic equipment.
7. Observe operating caution labels on all machinery.
8. Explain consequences of violating safe operating rules.

Learning activities:

1. Using the owners manual, correctly perform daily maintenance and observe safety check.
2. Start and stop a tractor and other machines according to the owners manual.
3. Check all instruments and describe the purposes of each.
4. Observe on each tractor the location of controls, switches, and gauge before beginning operation.
5. Practice general safety rules at all times.
6. FFA conduct tractor operators' contest.
7. FFA sell slow moving vehicle signs.
8. FFA sell tractor caution lights.

F. Electrical safety

Competencies - students will be able to:

1. Identify electrical hazards on the farm.
2. Apply electrical safety practices on the farmstead.
3. Check electrical circuits for adequate outlets, insulation and load carrying capacities.
4. Provide first aid for electric shock victims.

Learning activities:

1. Fill out a check list on electrical farm hazards.
2. Fill out a check sheet of safety practices for the farmstead; correct any that were checked unsafe.
3. Conduct a survey of electrical circuits carrying capacity, insulation, and outlets; correct any faulty equipment.
4. Practice electrical shock first aid, (nurse could assist).

G. General farm safety

Competencies - students will be able to:

1. Locate and mark danger areas around the farm.
2. Use safe hunting practices.
3. Adopt water safety practices.
4. Use ladder correctly and observe safety rules in climbing.

5. Restrain livestock safely.
6. Observe severe weather precautions.
7. List phone numbers of emergency aid.

Learning activities:

1. Make a check list of general farm hazards. Mark or correct these hazards.
2. Demonstrate gun safety and hunting regulations.
3. Have a qualified life guard or resource person in to give tips on water safety and first aid.
4. Observe firemen climbing or have firemen talk on safety in climbing and fire fighting.

Instructional Aids

1. Agriculture Shop Safety, Transparency, Missouri Instructional Materials Laboratory.
2. Safety, Transparency, Missouri Instructional Materials Lab.
3. Tractor Safety: Teach It-Don't Preach It, Film, John Deere.
4. John Deere Roll-Gard, Film, John Deere.
5. Operating Farm Tractors and Machinery, Film, ISU Media Resource.
6. Tractor Safety, Transparencies, Illinois Vo-Ag Service.
7. Don't Push Your Luck, Film, ISU Media Resource.
8. Farm Petroleum Safety, Film, ISU Media Resource.
9. A Safe Shop, Film, ISU Media Resource.
10. Safe Use of Pesticides, Film, ISU Media Resource.
11. Chemicals Keep Locked, Film, ISU Media Resource.
12. Play Safe With A Spring Safety Check, Slides, ISU Media Resource.
13. Farm Petroleum Safety, Film, Iowa Farm Bureau.
14. Farm Tractor Safety, Film, Iowa Farm Bureau.
15. Poisons in Your House, Film, Iowa Farm Bureau.
16. Tornado, Film, Iowa Farm Bureau.
17. Farm Safety Review, Booklet, National Safety Council.
18. Teaching Units in Farm Fire Safety, Purdue University.
19. View Safe Rural Crossroads No. AE987, ISU Extension Service.
20. Chemical Storage, No. CS8, ISU Extension Service.
21. Safe Living-Find The Hazards, PM546, ISU Extension Service.
22. Power Tool, Safety and Operation Manual, No. 173, Hobar.
23. Power Tool, Safety and Operation Packet, No. 273, Hobar.
24. Safety Exams, No. 601-624, Hobar.

Storage and Materials Handling

Problem Areas

A. Storage and distribution systems for crops and feeds
B. Feed conveyors, elevators, augers and equipment
C. Feed wagons
D. Grain drying systems
E. Livestock waste handling systems and equipment

Competencies and Learning Activities

A. Storage systems

Competencies - students will be able to:
1. Identify the common storage systems for crops and feeds.
2. Compare types of systems for storage of crops and feeds.
3. Calculate the capacity of given storage facilities.
4. Describe the four basic parts of a livestock feeding system.
5. Explain the need for a systematic flow of materials.

Learning activities
1. Research types of storage facilities and report to class.
2. Field trip to different types of storage facilities.
3. Compare common storage structures for use in grain, roughage and feed handling.
4. Given dimensions of storage structures, calculate the volume and capacity.
5. Plan a flow diagram of operations of a livestock feeding system.

B. Feed conveyors, elevators, augers and equipment

Competencies - students will be able to:
1. Explain principles of materials handling.
2. Identify types of equipment used in handling crops or feeds.
3. Calculate the capacity of conveyors, elevators and augers.
4. Identify and explain the function of auger meters, belt-type blenders, vibrator meter and dribble-feedmeter.

Learning activities:
1. Field trip to observe automated feeding operation.
2. Contact commercial companies for brochures on equipment available.
3. Using formulas for capacities, calculate the capacity of elevators and augers.
4. Invite equipment handling company representatives to speak to class.

C. Feed wagons

Competencies - students will be able to:
1. Identify types of feed wagons.
2. Compare types of feed wagons for handling different feeds.
3. Describe the need for versatility in selecting a feed wagon.

Learning activities:
1. Secure commercial brochures of products available.
2. Consider the advantages and disadvantages of false endgate, auger unload, gravity unload, chain conveyor, cross conveyor or dump wagons for feed or crop handling.
3. Prepare a display of feed or crop handling model equipment.

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D. Grain drying systems

Competencies - students will be able to:
1. Identify types of crop dryers.
2. Compare advantages and disadvantages of the available crop dryers.
3. Compare crop dryers as to suitability for use in the home farm harvest system.
4. Describe how crop dryers work.
5. Recognize the limitations of dryers in crop harvest and handling or storage systems.

Learning activities:
1. Secure brochures of available crop dryers.
2. Compare fuel and power costs per bushel for the available dryers.
3. Determine the type of crop dryer best suited for a specific crop harvest system.
4. Field trips to farms with different types of dryers.

E. Livestock waste handling systems and equipment (Refer to Agricultural Resources and Conservation Guide, Land Use Planning and Water Resource Management)

Competencies - students will be able to:
1. Describe regulations concerning lagoons.
2. Explain systems for handling animal wastes in liquid and solid form.
3. Explain how a lagoon functions.
4. Summarize the standards for disposal lagoons.

Learning activities:
1. Field trip to animal waste handling systems.
2. Calculate the amount of total waste products produced by a given livestock enterprise.
3. Compare systems of waste handling for a given livestock enterprise.
4. Determine the costs of handling livestock waste and the fertilizer value of the wastes.

Instructional Aids
1. How to Handle Wet Stored Corn, PM562, ISU Extension Service.
2. Insulation and Heat Loss, AED-13, MWPS.
3. Materials Handling-Mechanics 1972, Wisconsin Dept. of Public Instruction.
4. Animal Waste Management, Filmstrip, IVATA.
5. Mechanical Silo Unloaders for Upright Silos, Bulletin No. F2188, USDA.
6. Automatic Feeding Equipment for Livestock and Poultry, No. F2198, USDA.
7. Proceedings of 1973 Livestock Waste Management Conference, Illinois Department of Agricultural Engineering.
8. Bin Drying Shelled Corn, PM313, ISU Extension Service.
9. Corn Storage-How and Where, PM319, ISU Extension Service.
10. Batch and Continuous Dryers for Shelled Corn, PM382, ISU Extension Service.

11. Aeration of Shelled Corn, PM407, ISU Extension Service.
12. Grain Storage Building, Bulletin No. 6059, USDA.
13. Storage Sheds, Bulletin No. 6086 and No. 6093, USDA.
14. Aids for Planning Mechanized Feeding, North Dakota Extension Service.
15. Waste Handling and Disposal Guidelines for Indiana Swine Producers, ID-83, Indiana Extension Service.
16. Waste Handling and Disposal Guidelines for Indiana Poultrymen, ID-82, Indiana Extension Service.
17. Waste Handling and Disposal Guidelines for Indiana Dairymen, ID-81, Indiana Extension Service.
18. Waste Handling and Disposal Guidelines for Indiana Beef Producers, ID-84, Indiana Extension Service.
19. Bibliography On Livestock Waste Management-1972, Booklet No. 17, MWPS.
20. Liquid Manure Tanks-Rectangular, Below Grade, No. 74303, MWPS.
21. Reinforced Concrete Manure Tanks, Slats and Beams, TR3, MWPS.
22. Anerobic Manure Lagoons, AED-1, MWPS.
23. Handling Liquid Manure, AED-8, MWPS.
24. Handling Swine Manure, AED-11, MWPS.
25. Oxidation Ditch for Treating Hog Wastes, AED-14, MWPS.

Welding and Metals

Problem Areas

A. Arc welding machines and equipment
B. Arc welding procedures
C. Gas welding equipment
D. Gas welding and cutting procedures
E. Metalwork

Competencies and Learning Activities

A. Arc welding machines and equipment

Competencies - students will be able to:

1. Describe two kinds of arc welders.
2. List the common equipment needed in arc welding.
3. Select and care for arc welding equipment.

Learning activities:

1. Compare the AC and DC welders (characteristics and uses).
2. Discuss the arc welding equipment observed on a field trip to a production plant.
3. Compare the common brands of welders in the shop and become familiar with the equipment manuals.
4. Observe the parts of a welder and indicate how the welder functions.

B. Arc welding procedures

Competencies - students will be able to:

1. Define commonly used terms associated with arc welding.
2. Describe four types of electrodes and the two common sizes.

3. Interpret the meanings of the numbers in the electrode code classification.
4. Label the parts of a drawing associated with the welding process.
5. Identify and describe the basic types of welding joints.
6. Demonstrate safety precautions in arc welding.
7. Explain the common reasons for poor welds.
8. Demonstrate the proper procedure of starting, stopping, and restarting a bead.
9. Recognize and explain welding problems caused by incorrect arc length, amperage setting and speed of travel.
10. Demonstrate the correct procedure in the flat, horizontal, vertical, and overhead welding positions.
11. Pass an arc welding safety test.
12. Successfully compete in the FFA-Ag. Mechanics Contest.
13. Correctly use a carbon arc welding attachment.
14. Control distortion when welding.

Learning activities:

1. Complete a work sheet on the definitions of arc welding terms.
2. Practice welding with common types and sizes of electrodes.
3. Discuss the electrode code classification.
4. Label the parts of a diagram of the welding process.
5. Display various types of welding joints.
6. Discuss the necessary safety precautions in arc welding.
7. Display various welds, and indicate the particular problem involved.
8. Demonstrate the proper procedure of starting, stopping, and restarting a bead (have partner criticize).
9. Practice welding at various arc lengths, different amperage settings, and at various travel speeds. Determine the conditions for consistently making good welds.
10. Practice making butt-welds in all positions, with the aid of a guide sheet.
11. Pass a welding safety test prior to learning to weld on the actual machine.

C. Gas welding equipment

Competencies - students will be able to:

1. Identify and describe the parts of an oxyacetylene unit, cutting torch, and accessories.
2. Select and care for gas welding equipment.
3. Demonstrate safe procedures for attaching cylinders.

Learning activities:

1. Fill out a skill sheet on identification of the oxyacetylene unit.
2. Demonstrate the removal of empty cylinders, the replacement of full cylinders, and proper hook-up and safety procedures.

D. Gas welding and cutting procedures

Competencies - students will be able to:

1. Demonstrate the steps (in proper order) of turning on, lighting, and adjusting.

2. Demonstrate the steps in turning off the oxyacetylene welding and cutting equipment.
3. Pass a safety test related to gas welding.
4. Choose the proper welding tip for the job.
5. Name and explain the parts of a cutting tip.
6. Correctly cut metal with a gas welder and be able to recognize and correct poor procedures.
7. Define and explain oxyacetylene terms.
8. Properly cut holes in mild steel.
9. Identify a backfire and flashback, and explain the causes.

Learning activities:

1. Demonstrate lighting, and adjusting the gas welder.
2. Practice adjusting the gas welder to a carburizing flame, a neutral flame, and an oxidizing flame.
3. Practice turning off the oxyacetylene welder as the guidesheet recommends.
4. Take a gas welding and cutting test prior to handling the equipment.
5. Demonstrate the use of the proper welding tip.
6. Complete a skill sheet on the parts of a cutting tip.
7. Complete work sheet on oxyacetylene terms.
8. Practice making 90° cuts in mild steel.
9. Practice cutting holes in mild steel, as explained on guide sheet.
10. Give a report on the characteristics of a backfire and flashback, and the correct procedure to follow if one of these should occur.

E. Metalwork

Competencies - students will be able to:

1. Identify common metal working tools.
2. Use correctly the common metal working tools.
3. Identify types of metals.
4. Dress correctly the power grinder.
5. Recondition correctly metal working tools.
6. Complete metal working projects according to blueprint specifications.

Learning activities:

1. Complete a work sheet by identifying indicated metal working tools.
2. Demonstrate correct use of the metal working tools.
3. Identify metals by spark test.
4. Recondition twist drill bits, chisels and screwdrivers.
5. Select and construct a metalworking project according to the plan or blueprint.

Instructional Aids

1. Oxy-Acetylene Flame Traits, Smith Welding Equipment.
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3. Arc Welding, Filmstrip (set of 3), Lincoln Electric Company.
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6. Arc and Oxy Welding, Transparency Masters, ISU Agricultural Engineering Department.
7. Metals and Welding, Hobar.

EVALUATION

Check students on their ability to:

1. Care for and maintain tools and equipment.
2. Identify 25 local occupations in the agricultural mechanics field.
3. Adjust tappets to correct setting.
4. Mix, place, finish, and cure concrete.
5. Assemble spark plug wires according to firing order.
6. Plan a farm service center for the home farm.
7. Read and use the operators manuals.
8. Develop safe working habits.
9. Square a piece of lumber.
10. Prepare a working drawing for a construction project.
11. Write out a bill of materials.
12. Cut a compound angle with portable electric saw.
13. Service dry-type air cleaner filter.
14. Repack and adjust wheel bearings.
15. Check and evaluate engine cylinder compression readings.
16. Select proper electrodes for welding.
17. Recondition a dull twist drill.
18. Select tip size and pressure settings for oxyacetylene welding operations.
19. Select proper size drill to tap threads.
20. Replace wheels on tool grinder.
21. Determine the material cost of a proposed project from a plan.
22. Install a 120V polarized grounded circuit.
23. Formulate plans for remodeling buildings.
24. Calculate the capacity of given storage facilities.
25. Install a 240V single phase electric power entrance panel to code/handbook specifications.
26. Install switches to control lights from two, three or more locations.
27. Check a resistor with a volt-ohm meter.
28. Determine the application rate of a field sprayer.
29. Adjust machinery to field conditions.
30. Identify operational differences between types of internal combustion engines.
31. Select machinery repair parts from parts catalog.
32. Select, set-up, use, repair, and make field adjustments on farm machinery.
33. Operate, service, and repair single and multiple cylinder engines.
34. Demonstrate welding skills on a welding project.
35. Demonstrate measuring, marking, drilling and cutting of metals.
36. Scores on pre- and post-tests.
37. Demonstrate meaningful work habits in the shop (attitude and efficiency).
38. Be qualified to apply for the Agricultural Mechanics Proficiency Award.
39. Develop a worthwhile home improvement project.
40. Apply learned skills on the home farm.

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Concrete and Concrete Masonry

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Agribusiness and Natural
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Curriculum Guide

FARM BUSINESS MANAGEMENT

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Grimes State Office Building
Des Moines, Iowa 50319

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SOURCE OF CURRICULUM GUIDES

The following ten curriculum guides in agribusiness and natural resources are available as a set from the Department of Public Instruction:

Agribusiness and Natural Resource Education

Animal Science

Agronomic Science

Agricultural Mechanics

Farm Business Management

Agricultural Supplies and Services

Agricultural Products Processing and Distribution

Horticulture

Agricultural Resources and Conservation

Occupational Experience in Agriculture

Order from Information and Publications Services Section, Department of Public Instruction, Grimes State Office Building, Des Moines, Iowa 50319.

Price, $5.00 per set of ten curriculum guides listed above. Please send remittance with order.

FOREWORD

This curriculum guide is one of ten developed for use by vocational and technical agribusiness instructors in planning instructional programs to meet the needs of their students. Elementary teachers and instructors in other subject matter areas at the secondary level may find the guide of value in introducing principles of career education in their instructional programs. Although much of the material is designed for use at the secondary or post-secondary levels, many of the competencies may be introduced at the awareness or exploratory levels of career education.

Instructors in multiple-man departments at the secondary level and in post-secondary schools may organize nine-week or semester courses around the units and problem areas outlined in this guide.

Appropriate competencies and learning activities have been provided for each problem area. The competencies listed are those determined in previous studies as needed by persons employed in farm business management. Instructional aids and references are listed for each unit.

A list of titles of occupations requiring competencies in farm business management has been included in the guide. It is assumed that only partial attainment of some competencies can be done at the secondary level. The competencies may not be mastered until the student has completed additional preparation at the post-secondary, young or adult class, or collegiate levels. It is assumed that "hands on" and occupational experience will be provided with class and laboratory instruction at all levels.

Evaluation of the instruction in farm business management should be based largely upon attainment of the competencies listed in this guide, and on the application of them as students participate in occupational experience programs.

Allocations of units and of instructional time in the four-year sequence of courses at the secondary level are presented in the curriculum guide titled, Agribusiness and Natural Resource Education. Also presented are suggested activities involving farm business management for teachers at the kindergarten through sixth grade level, and suggested outlines of subject matter to be included in exploratory programs at the junior high school level.

Curriculum Guide, Farm Business Management was prepared by Michael Plueger, Veterans Farm Coop Instructor, Kirkwood Community College, Cedar Rapids, Iowa; Jim Tibbles, Vocational Agriculture Instructor, Tri-Center, Neola, Iowa; and by Joseph R. White, Farm Operation and Management, Ellsworth Community College, Iowa Falls, Iowa (Committee Chairman).

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Much credit is due the members of a steering committee which met for three sessions in advance of the workshop to determine the areas to be involved and the format to be followed. The following were members of the steering committee:

State Consultant Staff in Career Education - Emerson Dettmann, Gerald Lamers and Elwood Mabon.

ISU Teacher Education Staff - Dr. Harold Crawford, Dr. Bennie Byler, Richard Carter and Dr. Thomas Hoerner.

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OCCUPATIONAL TITLES - FARM BUSINESS MANAGEMENT

Instructional programs based upon content in this guide will prepare individuals for job entry, will upgrade occupational skills, or will prepare the learner for further occupational preparation.

1. Farmer or Rancher
    - A. General
    - B. Grain
    - C. Livestock
2. Professional Farm Manager
3. Farm Worker
4. Custom Machinery Operations Manager
5. Farm Real Estate and Appraisal
6. Farm Loan Advisor
7. Record Association Fieldman

FARM BUSINESS MANAGEMENT

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GENERAL OBJECTIVES

Students completing instruction in farm business management will have developed the ability to (1) recognize farm management problem areas, (2) assemble the necessary essential facts needed to analyze the problem areas, (3) apply sound, practical management principles in solving the problems, and (4) be aware of occupational opportunities in farm business management.

UNITS

Occupational Opportunities
Credit and Total Money Management
Records and Record Analysis
Farm Business Organization
Government Agencies and Farm Organizations
Marketing Management
Machinery Management
Labor Management
Real Estate Appraisal: Lease or Purchase
Risk Management
Estate Planning

Occupational Opportunities

Problem Areas

A. Livestock enterprise management
B. Crops enterprise management
C. General and commercial farm management
D. Farm loan advisor
E. Custom operation management

Competencies and Learning Activities

A. Livestock enterprise management

Competencies - students will be able to:

1. List management opportunities in specialized purebred and commercial hog production.
2. List management opportunities in beef cattle production: purebred, commercial cow-calf, feedlot.
3. List management opportunities in the specialized sheep and lamb production industry.
4. Describe management opportunities in the poultry and egg production industries.
5. Describe management opportunities in the dairy industry.
6. Describe management opportunities in the total horse industry.

Learning activities:

1. Use Handbook of Agricultural Occupations to find and classify employment opportunities in livestock enterprise management. (See Animal Science Guide).
2. Field trips to specialized livestock and poultry farms.
3. Student team interviews with livestock and poultry managers (three-man teams of students to question various managers and report to class).

B. Crops enterprise management

Competencies - students will be able to:
1. Find and identify management opportunities in specialized field crop production in Iowa (sweet corn, pop corn, potatoes, etc.)
2. Identify management occupational opportunities in seed production.
3. Identify occupational opportunities in management of row crop, small grain, and forage production.

Learning activities:
1. Field trips to interview managers of crop operations.
2. Use of references to find and list opportunities. (See Agronomic Science Guide).

C. General and commercial farm management

Competencies - students will be able to:
1. Identify the background and education needed to become a general farm manager.
2. Identify the background and education needed to become a commercial farm manager.

Learning activities:
1. Interview a manager(s) of a general farm operation.
2. Class interview professional farm manager(s).

D. Farm loan advisor

Competencies - students will be able to:
1. Identify the various governmental and commercial agencies and organizations involved in farm loans.
2. Describe the background and education needed to become a farm loan advisor.

Learning activities:
1. Class field trips to interview farm loan advisors: governmental and commercial.
2. Use Handbook of Agricultural Occupations to identify opportunities and salaries.

E. Custom operation management

Competencies - students will be able to:
1. Identify those custom operation opportunities in livestock management (feeding, breeding, parasite prevention and control).
2. Identify those management opportunities in custom cropping machinery operation.
3. Identify the laws and licenses pertaining to custom operations.

Learning activities:
1. Field trips to interview custom operators and managers.
2. Class interview an attorney(s) about custom operation laws and licenses.

Instructional Aids

1. Careers in Farm Services - filmstrip - Vocational Education Productions - California Polytechnic State University.
2. Cattlemen - A Rancher's Story, film, ISU Film Library.
3. Cattlefeeders, the - film. ISU Film Library.

Credit and Total Money Management

Problem Areas

- A. Credit source identification; analyzation and selection
- B. Credit instruments
- C. Calculating credit needs: farm business and personal
- D. Calculating credit costs
- E. Developing total farm business financial plans based on individual's business strengths and weaknesses

Competencies and Learning Activities

A. Credit source identification; analyzation and selection

Competencies - students will be able to:

1. Identify sources of farm credit (government and commercial).
2. Identify factors in financial statements and establish a credit rating for each statement.
3. Define common terms used in notes, mortgages, and financial statements.
4. List and describe the three types of farm credit.
5. Outline procedures to follow in obtaining farm loans.
6. List those factors that a lender should look for in a borrower.
7. List those factors that a borrower should look for in a lender.

Learning activities:

1. Individual students research and report on different sources of credit.
2. Study and discuss common terms used in farm credit.
3. Students classify by type of credit needed, three loan applications.
4. Class interview representatives of PCA, Federal Land Bank, Farmers Home Administration, and local bank farm department manager:
    - (a) procedures required to obtain loans
    - (b) what a lender looks for in a borrower
    - (c) what a borrower should look for in a lender

B. Credit instruments

Competencies - students will be able to:

1. Identify and evaluate various types of net worth statements.
2. Identify and evaluate types of cash flow forms.
3. Identify various loan forms from lending agencies.

Learning activities:

1. Students compare and discuss examples of net worth statements.
2. Students compare and discuss examples of cash flow forms.
3. Students visit farm department of local lending agencies to discuss their loan forms.

C. Calculating credit needs: farm business and personal

Competencies - students will be able to:

1. Explain relationship of farm business net worth to credit limits.
2. Determine the repayment capacity and schedule of a sample farmer given his cash flow, inventory, and net worth.
3. Determine ratio of assets to liabilities in competency no. 2.
4. Define the interrelationship of farm business and personal credit needs in obtaining a loan.
5. Identify and classify family living expenses (example of own family).
6. Prepare a budget for a farm: business and personal.
7. Prepare and analyze a cash flow statement.

Learning activities:

1. Each student develop a personal budget for his, or for a "typical" farm family.
2. Each student work out a cash flow statement for a sample farm.
3. Students identify money needs for competencies (1) and (2) above, and determine the feasibility of the loans needed.

D. Calculating credit costs

Competencies - students will be able to:

1. Identify the methods of interest calculation used by various lenders.
2. Calculate interest rates and amounts from problems provided.
3. Interpret repayment terms and options.
4. Explain the values of loan consolidation.

Learning activities:

1. Figure interest costs using different methods of calculating interest.
2. Work problems using various repayment options.
3. Compute the annual amount of interest paid by a given farmer in a given situation.
4. Compute the interest percentage when given total debt and repayment plan.

E. Developing total farm business financial plans based on individual's business strengths and weaknesses

Competencies - students will be able to:

1. Develop a total farm financial plan.
2. Analyze and list the differences between a profitable farm business and an unprofitable one by studying the financial records of each operation.
3. Rate various farm business enterprises as to financial risk level.
4. Recognize typical loan security requirements.
5. Distinguish the relationship of capital to other farming resources.
6. Outline importance of adequate operating reserves.

Learning activities:

1. Field trips to various types of farming operations to gain insight into possible strengths and weaknesses.
2. Study and interpret farm budgets and records from farm business associations.
3. Analyze a farm business and develop the total farm financial plan for it.

Instructional Aids

1. Teacher's Guide to Farm Money Management - Department of Agricultural Education - Ohio State University.
2. Business Money Management - Department of Agricultural Education - Ohio State University.
3. Introduction to the Farm Business Planning and Analysis Program and Teaching Units - Department of Agricultural Education - Ohio State University.
4. Credit Where Credit Is Due - film - ISU Film Library.
5. The Wise Use of Credit - film - ISU Film Library.
6. Farm Business Management - Instructor's Guide - U.S. Department of Health, Education, and Welfare.
7. Iowa Farm Business Association Summaries - Iowa State Extension Service.
8. Credit, A Capital Idea - film - Film Library - Farm Credit Banks of St. Paul.

Records and Record Analysis

Problem Areas

A. Identification and comparison of record systems, methods, and values
B. Record system terminology
C. Inventory calculations and control
D. Depreciation schedules and methods
E. Cash flow calculations
F. Budgeting: business and personal
G. Records for tax purposes
H. Investment credit
I. Record analysis
J. Business and personal filing systems

Competencies and Learning Activities

A. Identification and comparison of record systems, methods, and values

Competencies - students will be able to:

1. Identify and list differences in record systems (computer-based, farm business association, commercial, and government).
2. Describe the values and uses of complete and accurate farm business and personal records.
3. List weaknesses commonly found in farm records.
4. Describe the differences, advantages, and disadvantages of accrual, and cash systems.

Learning activities:

1. Students study, analyze and discuss examples of various record systems commonly used.

2. Students research and list the values and uses of farm records.
3. Students invite a bank (or other) farm loan representative to discuss weaknesses encountered in farm records.
4. Using two farming program examples, students determine which system, cash or accrual, to follow for each.

B. Record system terminology

Competencies - students will be able to:
1. Interpret and compute net worth.
2. Interpret and compute net income.
3. Explain the difference between farm and nonfarm accounts.
4. Distinguish the difference between and give examples of asset and liability accounts: external and holding.
5. Define and give examples of receipt and expense accounts (operating or service accounts and earnings or productive enterprise accounts).
6. Describe and discuss the possible production efficiency record components (for crops and livestock and machinery and labor).
7. Explain and work an example of owner's equity.
8. Define and give examples of assets: current, working and fixed.
9. Distinguish and give examples of categories of liabilities (short, intermediate, and long-term).
10. Interpret and give examples of casualty losses.

Learning activities:
1. Students use farm accounting and business analysis resource materials to find definitions and examples of accounting terms.
2. Study and discuss the major components of a farm records and accounts flow chart.
3. Students work basic problems in proper farm accounting based upon accounting terminology.

C. Inventory calculations and control

Competencies - students will be able to:
1. Explain the values of an accurate inventory.
2. Describe the common methods of valuing farm properties: market cost, net market price, farm production cost, cost minus depreciation, cost minus depletion, and capitalization.
3. Identify the Internal Revenue Service restrictions which apply to inventory methods and those assets included in the inventory.
4. Accurately inventory a farm business.

Learning activities:
1. Students, using home-farm situations and reference materials, list and discuss the values of an accurate, complete record system.
2. Class work problems using the common methods of valuing farm properties.
3. Interview an attorney or accountant, covering internal revenue restrictions on inventories.
4. Students inventory home farm or other farm business.

D. Depreciation schedules and methods

Competencies - students will be able to:
1. Identify the three major purposes of depreciating an asset.
2. Identify and work simple examples of three methods of depreciation: straight-line, declining-balance, and sum-of-the-years-digits.
3. Give examples of the three major causes associated with depreciation: wear and tear, obsolescence, and deterioration.
4. Work an example of fast tax write-off.
5. Identify Internal Revenue Service restrictions in depreciating properties.

Learning activities:
1. Students use their farm business inventories to identify depreciable assets.
2. Given a list of common depreciable assets, students compute depreciation using the three methods of depreciating.
3. Using home farm situations, students show examples of the causes of depreciation.
4. Given examples in both machinery and breeding livestock, students compute examples of fast tax write-off.
5. Using an attorney or an accountant, identify and discuss internal revenue restrictions on depreciation of assets.

E. Cash flow calculations

Competencies - students will be able to:
1. Identify and evaluate various types of cash flow forms (refer to Agricultural Credit and Total Money Management Unit).
2. Accurately complete a cash flow by months as transactions are entered in records.
3. Compare and analyze the differences between the projected and the actual cash flow in the records.

Learning activities:
1. Student review types and purposes of cash flow statements.
2. Students analyze and discuss the reasons for the differences occurring between a projected cash flow and an actual recorded cash flow summary.

F. Budgeting: business and personal

Competencies - students will be able to:
1. Describe the advantages of a complete and comprehensive budget.
2. Identify common problems in establishing a budget and adhering to it.
3. Explain those categories included in a complete budget: operating sales, capital sales, operating expenses, capital expenditures, family living expenditures, money borrowed, and repayment of borrowed money.
4. Fill out a complete budget, categorizing items in no. 3 above. (Refer to Unit E of this guide).

Learning activities:
1. Research and discuss the advantages and the problems encountered

in budgeting and following a budget.
2. Students fill out cash flow budgets, using own family and business situations.
3. Compare and discuss the budgets.

G. Records for tax purposes

Competencies - students will be able to:
1. Identify those business and personal tax deductible expenditures.
2. Identify all taxable income transactions.
3. Illustrate the tax positions and advantages/disadvantages of cash vs. accrual accounting methods.
4. Identify those records needed for tax purposes in these transactions: land development costs, deferring taxes, net operating losses, and sales or trades of property.

Learning activities:
1. Each student identify one tax deductible expenditure and explain why it is deductible.
2. Students make a list of taxable income items dividing them into personal or business tax categories.
3. Students research and have class discussions concerning land development costs that are deductible, methods of deferring taxes, recording net operating losses, and sales or trades of property.

H. Investment credit (1973 provisions)

Competencies - students will be able to:
1. Explain the purposes of investment credit for use in farm business management.
2. Itemize investment credit transactions in the records.
3. Compute investment credit on used and new machines and on eligible livestock.
4. Identify the decisions to make concerning machinery vs. labor due to investment credit.

Learning activities:
1. Students interview an attorney about the purposes and mechanics of investment credit.
2. Itemize investment credit transactions and place in the record system.
3. Work several problems involving purchases and sales of items eligible for investment credit.
4. Work one problem involving machinery vs. labor, utilizing investment credit principles.

I. Record analysis

Competencies - students will be able to:
1. Analyze and identify strengths and areas of weakness in a net worth statement.
2. Compute monthly, quarterly, and annual receipts and expenditures by enterprises.
3. Analyze an example farm business in terms of the:

   (a) Size of the business.
   (b) Financial results.
   (c) Cropping program (refer to Agronomic Science Guide for measurable efficiency factors
   (d) Livestock program (refer to Animal Science Guide for measurable efficiency factors).
   (e) Labor, power, and machinery efficiency (refer to appropriate Farm Business Management Units).

4. Develop realistic farm production goals in relation to land capability and resources available.
5. Develop realistic family goals.

Learning activities:

1. Class study and discuss the possible strong and weak areas in a net worth statement.
2. Isolate various enterprise expenditures and receipts from a farm's records, and using adding machines and calculators, analyze enterprise efficiencies.
3. Divide the class into crops and livestock teams, to set realistic efficiency goals and report to the class as a whole for class debate.
4. Each student contribute one family goal he considers realistic, desirable, and attainable to be listed on the chalkboard and discussed.

J. Business and personal filing systems

Competencies - students will be able to:

1. Identify the values of a complete but simple filing system for farm business records.
2. Identify and recognize different kinds of filing systems.
3. Outline steps necessary to set up an organized and useful filing system that will fit the individual's needs.

Learning activities:

1. Students research and outline the importance of a filing system to a farm business.
2. Students analyze and report on types of filing systems.
3. Students develop and put to use an individual filing system.

Instructional Aids

1. Successful Farming Vocational Agriculture Teaching Units, Successful Farming, Des Moines, Iowa.
2. Introduction to the Farm Business Planning and Analysis Program and Teaching Units, Ohio State University.
3. Farm Business Planning and Analysis Filing System, Ohio State University.
4. Shady Lane Farm Management and Records Problem, Vocational Education Productions.
5. DuMore Farm Records Problem, Vocational Education Productions.
6. Farm Records - A Management Tool, Ohio State University.
7. Budget Worksheets for Students of Vocational Agriculture - University of Nebraska.
8. Farming Management Record, Standard Oil Co.
9. What Records Tell About This Farm - slide film 357A, Vocational Agriculture Service, University of Illinois

10. Summarizing and Analyzing Records - slide film 352, Vocational Agriculture Service, University of Illinois.
11. Increasing Earnings Through Farm Records - slide film 353, VAS, University of Illinois.
12. Starting to Keep Records - 01232P-350 NASCO.
13. Ohio Farm Management Handbook, Ohio State University.

Farm Business Organization

Problem Areas
- A. How businesses are organized
- B. Sole proprietorship
- C. Partnership
- D. Cooperative corporation
- E. Ordinary corporation

Competencies and Learning Activities

A. How businesses are organized

Competencies - students will be able to:
1. Define "business" and correlate it with farm businesses.
2. Describe "capitalism," "socialism," and "communism" in terms of methods of doing business on the farm.
3. Contrast "free enterprise" and "controlled capitalism" in terms of farm business management.
4. Identify the differences between "private-property rights" and "eminent domain" as they affect farm business management.
5. Define the five types of business utility: form, time, place, elementary, possession as they affect farm management.
6. Analyze the importance of location as it affects various types of farm businesses.

Learning activities:
1. Student identify and interpret the definitions and application of business terms.
2. Chart advantages and disadvantages of farm business management under capitalistic, socialistic, and communistic systems.
3. Students contact local attorney to hold class discussion concerning private-property rights and eminent domain.
4. Class visits to farms with enterprise location problems and to farms with "ideal" enterprise locations.

B. Sole proprietorship

Competencies - students will be able to:
1. Identify the advantages and disadvantages of sole ownership of the farm business.
2. Identify problems in capitalization and expansion under sole ownership.
3. Identify and discuss those qualities needed by a sole ownership individual to succeed in the farm business.

Learning activities:
1. Field trips to sole proprietorship farm businesses.

2. Students research and solve problems identifying advantages and disadvantages of sole proprietorship.

C. Partnership

Competencies - students will be able to:

1. Summarize the advantages and disadvantages of a farm business partnership.
2. Distinguish the various types of partnerships.
3. Draw up a partnership agreement (contract).

Learning activities:

1. Invite lawyer or banker to discuss with class the place of partnerships in farming.
2. Divide class into pairs; draw up farm partnership contracts.
3. Field trips to visit farm partnerships: family and nonfamily.

D. Cooperative corporation

Competencies - students will be able to:

1. Trace the history of the farm cooperative movement.
2. Explain the reasons for the formation and growth of cooperatives.
3. Outline the various types and purposes of cooperatives in the area.
4. Diagram the basic structure of cooperatives.
5. Describe the mechanics of patronage dividends.

Learning activities:

1. Class trips to visit various cooperatives in the area. Interview the managers.
2. Class members serve as junior board members of local cooperatives.
3. Class organize a "cooperative" and transact "business." May be an FFA subsidiary.

F. Ordinary corporation

Competencies - students will be able to:

1. Interpret corporate terms and diagram a basic corporate structure.
2. Outline the values of a family farm business corporate structure.
3. Describe the formation and operating activities of a farm corporation.

Learning activities:

1. Student analyze advantages and disadvantages of incorporating the home farm business.
2. Class interview attorney(s) concerning values and mechanics of incorporation of the farm business.
3. Class visit to interview officers of a farm corporation.

Instructional Aids

1. Source Unit: Agricultural Cooperatives. University of Illinois.
2. Cooperation in the Business Community. Purdue University.
3. Four Common Ways of Doing Business. Vo-Ag Service, University of Illinois.

4. A Course of Study in Cooperation and Cooperatives. University of Wisconsin.
5. This is Iowa - The Cooperative Story. Film - ISU Film Library.
6. The American Private Enterprise System. Slidefilm, Vocational Agriculture Service, University of Illinois.
7. Four Methods of Doing Business. Felco, Land O Lakes, Fort Dodge.

Government Agencies and Farm Organizations

Problem Areas

A. Governmental agencies affecting agriculture
B. Farm programs
C. Farm organizations
D. Commodity organizations

Competencies and Learning Activities

A. Governmental agencies affecting agriculture

Competencies - students will be able to:

1. Identify government agencies dealing with agriculture - Soil Conservation Service, Agricultural Stabilization and Conservation Service, Farmer's Home Administration, Federal Land Bank, Production Credit Association, Extension Service, Rural Electric Administration.
2. List the structure and purposes of each of the governmental agencies in competency No. 1.
3. Identify procedures used in applying for or obtaining assistance from the various agricultural agencies.
4. Outline how each of the agencies in No. 1 has benefited agriculture in this community.

Learning activities:

1. Student prepare a summary of the government agriculture agencies in the community and scope of the activities of each.
2. Student teams interview representatives of the various governmental agricultural agencies and report back to the class as to the organizational structure and function of these agencies.
3. Field trips to students' and other farms to observe what farmers have accomplished in cooperation with governmental agencies.
4. Agency representatives talk to the class concerning applying for participation in the various agency programs.

B. Farm programs

Competencies - students will be able to:

1. Identify the production and marketing programs administered by the U.S.D.A.
2. List the purposes of the farm programs.
3. Compute the benefits of programs (price supports, payments, loans, etc.) to student farm(s).
4. Describe the contribution of the governmental farm program to their home farms.

Learning activities:
1. Prepare summary of the current farm program from ASCS.
2. Interview the local ASCS office manager to identify the current farm program structure.
3. Compare advantages and disadvantages of the current farm program.
4. Compute the financial benefits a class member(s) farm operation could receive by participation in the current farm program.

C. Farm organizations

Competencies - students will be able to:
1. Identify farm organizations - Farm Bureau, National Farmers Organization, Farmers Union, National Grange.
2. Outline the structure and background of each of the farm organizations.

Learning activities:
1. Individual students research and report on the purposes and accomplishments of each of the various farm organizations.
2. Outline and interpret the effect of the farm organizations on the local community.
3. Students interview a panel of farm organization leaders about their organizations' goals and objectives.
4. Invite representatives of farm organizations to speak or serve as resource persons in classes.

D. Commodity organizations

Competencies - students will be able to:
1. Identify farm commodity organizations, state and national (Pork Producers, Beef Producers, Dairy Association, Soybean, etc.).
2. Identify the processes and costs of membership.
3. List the goals and objectives of each of the commodity organizations.

Learning activities:
1. Individual or teams of students research and report on the various commodity organizations.
2. Analyze and interpret the effect that the commodity groups have had in their research and promotional efforts.
3. Students invite representatives of the organizations to talk to the class.

Instructional Aids
1. Films and promotional brochures from state and national Pork Producers Association.
2. Films and publications from Iowa Cattleman's Association.
3. Publications and films from state and national Dairy Associations.
4. Films and pamphlets from Soybean Growers Association.
5. Films and pamphlets from Iowa Turkey Grower's Association.
6. Films and pamphlets from Iowa Poultry Association.

Marketing Management

Problem Areas

A. Identifying and analyzing grain markets

B. Identifying and analyzing livestock markets
C. Futures market use in farm business management

Competencies and Learning Activities

A. Identifying and analyzing grain markets

Competencies - students will be able to:

1. Describe the possible grain markets.
2. Explain grain marketing trends, what has caused the trends, and how they affect farm business management.
3. Describe factors that affect grain prices.
4. Interpret governmental influence on grain marketing.
5. Define the transportation problems involved in grain marketing.
6. Identify the effects of exports and imports on grain marketing.
7. Analyze and compare cooperative versus private or corporate grain marketing.
8. Outline the importance and effects of grain storage on marketing.
9. Interpret and analyze the effects of marketing news and marketing information on grain marketing.
10. Describe the importance of competition among grain markets.

Learning activities:

1. Students research and discuss the possible grain markets they could use.
2. Class members interview farmers concerning their experiences with changing grain storage and marketing trends.
3. Class take a field trip to a local elevator to observe grain marketing and interview the manager.
4. Students research and report on government effects on grain marketing.
5. Analyze and discuss the changes taking place in grain marketing in grain marketing in the local community, and the effects they have on total farm business management.
6. Students bring in market news information and discuss it in class.

B. Identifying and analyzing livestock markets

Competencies - students will be able to:

1. Describe the types of livestock markets.
2. Identify livestock marketing trends and explain how they have affected farm business management.
3. List factors that affect livestock prices.
4. Interpret governmental influence on livestock marketing.
5. Analyze the importance of market news and marketing information on livestock marketing.
6. Outline the importance of exports and imports on livestock marketing.
7. Explain the importance of competition among livestock markets.

Learning activities:

1. Research and discuss the various types of livestock markets.
2. Class take field trips to livestock auctions and other markets.
3. Class members interview farmers about their experiences with various livestock markets.

4. Research and report on governmental influence on livestock marketing.
5. Analyze the changes that are taking place in livestock marketing in the local community, and how these changes affect total farm management decisions.

C. Futures market use in farm business management

Competencies - students will be able to:

1. Trace the development of the futures market.
2. Identify the purposes of the futures markets.
3. Analyze the role of the futures market and their effect on grain and livestock prices on the farm.
4. Describe the regulations that control the futures market.
5. Analyze the possible uses of hedging by the farmer.
6. Interpret how hedging differs from speculation.
7. Outline the procedures involved in buying and/or selling futures contracts.
8. Identify the various contract sizes and commission costs of different commodity contracts.
9. Interpret what is meant by "margin money" and how this is determined.
10. Outline the information that the futures markets make available.

Learning activities:

1. Students research and discuss the development and the purposes of futures markets.
2. Class work futures market problems (both buying and selling) including margin and commission costs.
3. Class members interview farmers who have used hedging as part of their marketing procedure.
4. Local elevator operator discuss with class how he uses the futures market in his operation.
5. Analyze and discuss the importance of the futures market to the farm business.
6. Class members invest $5,000 each in a simulated hedging transaction with corn, soybeans or live hogs. They will follow the market for a three-month period and sell when advisable.

Instructional Aids

1. Grain Marketing Packet - Iowa State University.
2. Grain Marketing - University of Illinois.
3. Instructional Units on Agricultural Marketing Principles - Ohio State University.
4. Marketing Farm Products Abroad - film - Iowa State University.
5. Marketing Grain Through a Grain Exchange - The Market Futures - slides - Iowa State University.
6. When Trading Begins - film - Iowa State University.
7. Marketing Agricultural Products. VAS2016a - Vocational Agricultural Service, University of Illinois.
8. Hedging With Live Beef Futures - slides - IVATA Instructional Materials.
9. Hedging With Grain Futures - filmstrip - IVATA Instructional Materials.

Machinery Management

Problem Areas

- A. Machinery needs determination
- B. Power and machinery purchasing
- C. Power and machinery leasing
- D. Custom hiring farm equipment
- E. Maintenance of machinery
- F. Economics of housing

Competencies and Learning Activities

A. Machinery needs determination

Competencies - students will be able to:

1. List and define terms used in machinery management decision making.
2. Identify power and machinery sources, kinds and capabilities.
3. Outline all power and machinery needs on their farm.
4. Calculate the power required for various farm machines.
5. Match the farm implement to the power unit.
6. Analyze various tillage methods and their effects on machinery program planning.
7. Analyze the effect of weather patterns on farm machinery program planning.
8. Determine annual use and how it affects average cost of operation.
9. Identify fixed and variable costs and explain how they affect cost of ownership.
10. Select needed power and machinery for the farm in order to schedule all jobs within available time.
11. Calculate farm power and machinery costs per acre for each machine selected.
12. Determine power and machinery needs for the various livestock enterprises.
13. Calculate power and machinery costs for the various livestock enterprises.
14. Analyze and select machines that have the latest and best safety and convenience features.

Learning activities:

1. Hand out list of machinery management terms to all students and assign each student several terms to define report to class.
2. Field trip to local dealer to analyze machinery available.
3. Students use their own farms and list all power and machinery needed to get all jobs accomplished.
4. Using provided references, students calculate the amount of power required to operate each machine.
5. Give students an example of a tractor's capabilities and have them list sizes of implements it could power.
6. Field trips to farms using various tillage methods and have students compare methods.
7. Do research and discuss in class the effects of weather on scheduling farm jobs and selecting machinery.
8. Have students define and list fixed and variable costs in owning tractors and machinery.

9. Have students work a machinery selection and scheduling problem for a class member's farm.
10. Calculate fixed and variable costs per acre for the machinery selection problem (no. 9) and analyze results.
11. Work a machinery selection problem for one or more livestock enterprise.
12. Calculate fixed and variable costs for the machinery selected for the livestock enterprises (no.11) and analyze them.
13. Visit some machinery dealers and have students list and be ready to discuss all good and bad safety features and convenience factors.

B. Power and machinery purchasing

Competencies - students will be able to:
1. Identify methods of purchasing equipment.
2. Analyze the alternative methods of purchasing equipment.
3. Analyze the alternative of joint ownership of equipment.
4. Compare costs of buying and using used and new machines.
5. Determine capital limitations as related to machinery planning and the total farm business operation.

Learning activities:
1. Students research and discuss in class the different methods of purchasing equipment.
2. List advantages and disadvantages of purchasing equipment using the various methods.
3. Determine interest, depreciation, repairs, taxes, etc., on some used and new machines and calculate the total fixed and variable costs.
4. Use records from home farms to determine what limitations should be placed on power and machinery purchasing.

C. Power and machinery leasing

Competencies - students will be able to:
1. Describe different types of leases.
2. Analyze the advantages and disadvantages of leasing.
3. Determine costs in leasing farm equipment.

Learning activities:
1. Do research and outline the different types of leases and leasing agreements.
2. List and discuss the advantages and disadvantages of leasing.
3. Students analyze their home farms to determine how they could use leasing and report to class.
4. Students interview company representative to determine costs of leasing.

D. Custom hiring farm equipment

Competencies - students will be able to:
1. Analyze the alternative of custom hiring.
2. Compare custom hiring to leasing.
3. Evaluate and list the possibilities of using custom hiring on the home farm.

Learning activities:

1. List advantages and disadvantages of custom hiring.
2. List advantages and disadvantages of custom hiring versus leasing versus purchasing.
3. Determine where custom hiring would fit into the machinery selection problem.
4. Determine where custom hiring would fit into the home farm.
5. Invite farmers to discuss their experiences with custom hiring equipment.

E. Maintenance of machinery (see Agricultural Mechanics Guide)

F. Economics of housing

Competencies - students will be able to:

1. Determine the value of machinery storage in terms of reduced maintenance, increased life, ease of adjustment of bolts, nuts, etc.
2. Determine the value of machinery storage in terms of specific machines (powered versus non-powered, large versus small, new versus used, etc.).
3. Determine which machines must be housed.
4. Calculate amount and costs of space needed to house machines in No. 3.

Learning activities:

1. List advantages and disadvantages of machinery storage and discuss in class.
2. List all machines that definitely must be stored and give reasons why, and the costs.
3. Use Ohio Farm Management Handbook to figure amount of space needed to house machines. (Figure amount needed by subtracting amount now available.)

Instructional Aids

1. Skill Sheets for Agricultural Machinery, No. 201, Iowa Instructional Materials, Agricultural Engineering, ISU.
2. Midwest Farm Planning Manual, Sidney James, ISU.
3. Modern Concepts in Machinery Management, Bower, ISU.
4. Farm Machinery Management, Boyd, ISU.
5. Planning Machinery Protection, 0546P-25, slide film, NASCO.
6. Ohio Farm Management Handbook, Ohio State University.
7. Introduction to the Farm Business Planning and Analysis Program and Teaching Units, Ohio State University.
8. Successful Farming Vo-Ag Teaching Unit #2: Machinery Management.

Labor Management

Problem Areas

A. Determing labor needs
B. Hiring and keeping labor
C. Managing available labor
D. Social Security requirements

Competencies and Learning Activities

A. Determining labor needs

Competencies - students will be able to:

1. Determine labor requirements for the various enterprises on the farm.
2. Analyze and indicate the amount of family labor available.
3. Design annual and seasonal work schedules for their farms.
4. Determine labor requirements for the various enterprises on the farms.

Learning activities:

1. Do research to determine how much labor is needed for each farm enterprise and prepare a labor distribution chart.
2. Identify and list the quantity of family labor available.
3. Analyze the over-all labor schedule and determine where additional labor would pay and where too much labor is used.
4. Analyze farm records and make decisions as to where and how to increase the total farm business to either justify present labor, or to add additional part-time or full-time labor.

B. Hiring and keeping labor

Competencies - students will be able to:

1. Identify sources of farm labor.
2. Identify and solve problems in hiring farm labor.
3. Develop definite agreements with hired workers about working conditions (working hours, wages, days off, meals, etc.).
4. Identify and solve problems in keeping labor.
5. Develop incentive programs agreeable to farm workers.
6. List farm jobs classed as hazardous occupations (see Farm Law unit).

Learning activities:

1. Do research and list various sources of farm labor.
2. Use bulletin FS-1380 "Problems of hiring and keeping full-time farm employees" to identify the problems and possible solutions.
3. Solve all problems listed in competency No. 2 (for example, students can write an ad for a newspaper, judge qualifications of selected students in the class as a prospective hired worker, etc.).
4. Each student give a report on what he would like to earn as an employee for a given full-time farm job.
5. Describe some incentive programs for hired farm workers.

C. Managing farm labor

Competencies - students will be able to:

1. Assign jobs to workers according to ability.
2. Give instructions to motivate workers to perform their job adequately.
3. Assign priorities to the farm work to be done.
4. Determine when to add resources to secure maximum use of available time and labor.

5. Identify problems in over-managing farm labor.
6. Schedule work to allow personal time for hired workers.

Learning activities:

1. Each student rate their capability of doing each of the farm jobs.
2. Divide class into groups and have each group determine the best workers to use by using the lists developed above in accomplishing a given set of jobs.
3. Students construct a list of instructions for use by farm workers on their home farms.
4. Have students classify a given set of jobs according to priority.
5. Analyze labor records to determine where to add production volume or labor.
6. Students give examples of over-managing farm labor.
7. Students prepare a labor distribution chart for their farm to allow adequate personal time for hired workers.
8. Interview farm managers who have several farm workers under their supervision.

D. Social Security requirements

Competencies - students will be able to:

1. Explain what Social Security is, and its purposes.
2. Compute Social Security withholding taxes for full- and part-time hired labor.
3. Compute self-employment tax on the home farm at the correct time.

Learning activities:

1. Students research and discuss in class what Social Security is and its value to the business and hired labor.
2. Students use "Financial Management" reference to determine when and how to figure Social Security taxes for part-time and full-time labor.
3. Invite Social Security representative to speak to class, or have boys interview him and get a tape recording which may be presented in class.

Instructional Aids

1. Ohio Farm Management Handbook, Ohio State University.
2. Agricultural Management, Montana State University.
3. Student Study Guide on Farm Management No. 1, University of Kentucky.
4. Student Study Guide on Farm Management No. 2, University of Kentucky.
5. Midwest Farm Planning Manual, Sidney James, ISU.
6. Introduction to the Farm Business Planning and Analysis Program and Teaching Units, Ohio State University.
7. Saving Time Doing Chores, 0574P, filmstrip. NASCO.
8. Successful Farming Vo-Ag Teaching Unit #3: Farm Management.

Real Estate Appraisal: Lease or Purchase

Problem Areas

A. Collecting and analyzing needed data
B. Farm building appraisal

C. Farm land appraisal
D. Methods of purchasing and financing

Competencies and Learning Activities

A. Collecting and analyzing needed data

Competencies - students will be able to:
1. Find and evaluate agricultural census date, county and state.
2. Analyze the annual Extension Service survey of farm real estate dealers by districts and state, containing high, low and average farm values.
3. Obtain and analyze farm sale data from the county records.
4. Collect and analyze crop yield data from the ASCS office.
5. Obtain and use soils information from the SCS office.
6. Obtain and analyze county zoning laws (if the county is zoned for land use).
7. Evaluate tiling, drainage district, and pipeline maps.
8. Obtain and evaluate information on land sales and estimated values from real estate dealers, farmers, vocational agriculture instructors, county extension director, etc.
9. Obtain, list, and evaluate community factors: roads, schools, churches, businesses, present industry and future possibilities, farm markets, transportation, and utilities available in relation to their effects on present and future land values.

Learning activities:
1. Students view transparencies of census data, county and state and discuss the status of farm production and numbers of farms.
2. Students study and discuss the annual survey of real estate dealers, and analyze the reasons for land value differences across the state.
3. Class visit to the county courthouse to find records of land sales and all other recorded information of value in calculating land values - property tax millage, zoning, tiling, drainage districts, pipelines.
4. Class visit to local ASCS office to check township corn yield base and other crop program data.
5. Class visit to SCS: interview personnel about soils and conservation practices and learn to read soils maps.
6. Class teams prepare questionnaires to use in obtaining land sales and estimated land values from farmers, bankers, County Extension Director and real estate dealers.

B. Farm building appraisal

Competencies - students will be able to:
1. List and explain the reasons for farm building appraisal, including: income tax deductions, costs of farm production, management records, estate settlement, insurance, property taxes, condemnation, sale, and use.
2. Estimate costs of remodeling buildings to fit current needs of livestock and crop plans.
3. Place a value on buildings producing income by the capitalization method.

4. Estimate current market value of buildings.
5. Estimate replacement costs less depreciation of buildings.
6. Place a value on a farmstead independent of the farm land, for acreage sale possibilities.
7. Accurately measure (and record all needed data) all the farm buildings for family and production purposes.
8. Evaluate problems in building placement in relation to each other, to drainage, and to neighbors.
9. Evaluate the water system for quality and quantity.

Learning activities:

1. Research and discuss the purposes of farm building appraisal.
2. Students check with building contractors and building supply outlets on costs of remodeling and report to the class.
3. Students work problems on capitalization, using several rates.
4. Class visit to a farmstead with a real estate dealer to discuss current market value of the farmstead as an acreage and as a production and living unit.
5. Class use tape measures and a report form to measure buildings and calculate their production and storage capacities.
6. Class use a report form to evaluate the condition of all buildings.
7. Students evaluate a farmstead as to building placement and problems needing solutions.
8. Students take water samples and send them to the State Hygienic Laboratory for nitrate and bacteria evaluation.
9. Students measure quantity of water flow for one or two hours.

C. Farm land appraisal

Competencies - students will be able to:

1. Accurately use a surveyor's instrument and record data.
2. Accurately measure land with the land wheel or chain.
3. Classify soil depth, texture, and type (see Agronomic Science Guide).
4. Take soil samples and evaluate the results (see Agronomic Science Guide).
5. Estimate crop yields using soils data and township yield data from ASCS.
6. Evaluate tile needed from observation and county tiling maps.
7. Evaluate weed problems and costs of solving the problems.
8. Evaluate miscellaneous items affecting farm land values: rocks, surface drainage, fences, trees, etc.
9. Using all data on land and buildings (unless it is bare land) place a value per acre and a total value on the farm, using current capitalization rates.
10. Compare the capitalized value with local current market values.

Learning activities:

1. Class choose a member's farm to appraise (or use a member's farm with complete buildings, and a member's farm land without a farmstead).
2. Class field trips to learn to use the surveyor's instrument and land measuring tools.

3. Class field trips to measure soil capabilities (slope %, depth, texture, type and take soil samples).
4. Class trips to evaluate all miscellaneous value factors affecting the land value.
5. Class calculate the value using current capitalization rates.
6. Class discussion of the total evaluation results, with a real estate dealer as a resource person.

D. Methods of purchasing and financing

Competencies - students will be able to:
1. Plan the loan structure required to purchase the appraised farm.
2. Differentiate between buying a farm with a full loan and buying it on contract.
3. Calculate the principal payments and the interest payments required.

Learning activities:
1. Refer to the Money Management Guide.

Instructional Aids
1. Ohio Farm Management Handbook, Department of Agricultural Economics and Rural Sociology, Ohio State University.
2. County Soils Maps, County SCS Office.
3. County Plat Books, County Extension Office, or sponsoring banks.

Risk Management

Problem Areas
- A. Farm insurance
- B. Farm safety
- C. Farm law

Competencies and learning activities

A. Farm insurance

Competencies - students will be able to:
1. Define insurance and explain its relationship to farm business management.
2. Evaluate the seriousness of losses in the farm business in relation to the financial picture of the manager and his business.
3. Identify that property which should be insured according to the risk of a loss, the financial burden if a partial or complete loss occurs, and the cost of insuring against the property loss.
4. Describe the kinds of insurance available for fire, wind, hail, water, drouth, and theft.
5. List sources of property loss insurance coverage and compare the coverages, costs, and reputation for settling claims of each.
6. Explain the advantages of 3 to 5 year coverage of property losses.
7. Identify and describe the types of motor vehicle coverage: bodily injury liability, property damage liability, uninsured motorist, medical payments, comprehensive, and collision.

8. Evaluate each type of vehicle insurance and its costs by: age of driver, type of vehicle, use of vehicle, and the record of the driver.
9. Classify liability insurance (other than vehicle) by the two risk types: members of the general public and farm employees.
10. Identify the coverage and costs of farm comprehensive personal liability insurance, employer's liability, and workmen's compensation.
11. List and discuss the two purposes of life insurance: protection in case of an untimely death of a member of the farm business and as systematic savings and investment.
12. Identify and evaluate the major types of life insurance: term, whole life, limited-payment life, and endowment.
13. Describe loan value, and cash value of life insurance.
14. Describe dividend options if insured with a participating company.
15. Explain life insurance options other than dividend: double indemnity, disability waiver of premium, settlement options, and interest options.
16. Describe the factors to consider when calculating life insurance needs: family income and who contributes to it, ages of family members, debt load and repayment, retirement income and Social Security.
17. Identify and evaluate the functions of health insurance.
18. Describe the major types of health insurance: hospital, surgical, regular medical, major medical, and loss of income.
19. Compare private company and organizational health insurance programs.
20. Explain factors in the farm business which determine the kind and amount of health insurance coverage to have.

Learning activities:

1. Divide class into teams to:
   a. Choose an area of farm business insurance to research.
   b. Contact qualified insurance men and agencies for information and materials.
   c. Prepare a comprehensive report for the class, complete with aids and resource people.
   d. Give a report to the class, both oral and a written summary of all pertinant information.

B. Farm safety

Competencies - students will be able to:

1. Identify safety practices and procedures in managing farm petroleum products.
2. Describe safety practices and procedures involved in managing livestock enterprises (see Animal Science Guide).
3. Summarize safety practices and procedures involved in farm machinery operation (see Farm Mechanics Guide).
4. Identify safety practices and procedures involved in handling farm chemicals (see Agronomic Science Guide and Animal Science Guide).
5. Explain safety practices and procedures involved with farm operations and jobs performed in and around the farm buildings (see Agricultural Mechanics Guide).

Learning activities:

1. Each student survey his home farm and make a complete list of all possible hazards and ways to eliminate or minimize them.
2. Each student solve one or more safety problem(s) on his farm, and give a complete report to the class, or conduct a class visit to see the results.

C. Farm law

Competencies - students will be able to:

1. Explain the structure of our court system.
2. List and interpret the laws concerned with the rights and liabilities of landlords and tenants.
3. Describe those laws concerned with the use and application of field crop chemicals.
4. Identify and interpret those laws pertaining to crop storage, chemical treatment, and sale.
5. Describe the laws affecting seed sales.
6. Identify and interpret those laws concerned with noxious weed control.
7. List and interpret those laws concerned with the buying and/or selling livestock and livestock products.
8. Summarize those laws concerned with pollution control, chemicals, soil, and livestock feeding.
9. Identify and explain those laws concerned with feed additive withdrawal.
10. Describe those laws concerned with farm machinery on the highways.
11. Identify and interpret those laws affecting hired labor usage.
12. Explain those laws concerned with liability on and off the farm.

Learning Activities:

1. Each class member, or teams of members, research one specific area of farm law.
2. Individuals or teams prepare reports on their area of responsibility and present copies, plus an oral report, to the class.
3. Invite an attorney to serve as a resource person as the reports are presented.

Estate Planning

Problem Areas

A. Management for tax savings
B. Family corporations
C. Wills
D. Trusts

Competencies and Learning Activities

A. Management for tax savings

Competencies - students will be able to:

1. List those reasons why estate planning is an important part of farm business management.

2. Correlate the increased ownership and increased equity in property with the need for planning for estate tax savings.
3. Define the difference between real property and personal property.
4. Identify the provisions of the federal estate tax and ways to legally reduce the taxes.
5. Identify the provisions of the state inheritance tax and methods of minimizing the tax.
6. Explain the provisions of the federal gift tax, and legal methods to use in reducing it.

Learning activities:

1. Students research the provisions of the federal and state estate tax regulations and the federal gift tax regulations.
2. Students solve problem involving a farm business and the family concerned with minimizing estate settlement costs in taxes.
3. Class members invite an attorney to answer questions concerning the family farm business problem.

B. Family corporations

Competencies - students will be able to:

1. Identify the basic corporate structure (see the Farm Business Organization in this guide).
2. Recognize the corporation structure advantage as to its limited liability to members of the estate.
3. Explain the family corporation advantage as a functioning unit even with the death of a member or members.
4. Summarize the advantage of the family corporation structure where several children are involved in the estate.
5. Illustrate the possibility of "double taxation" of dividends unless provisions are made to issue only one class of stock and not more than 10 persons are involved in the corporation.
6. Construct a simple corporate structure for the home farm business, involving the entire family.

Learning activities:

1. Students review and discuss the structure of corporations.
2. Students solve a common problem, given the family and farm business structure and financial status.
3. Students set up a corporate structure for their home farm, leading to the estate settlement within the family.

C. Wills

Competencies - students will be able to:

1. Outline the purposes of a will.
2. List the steps to take to make a will.
3. Use the legal terminology in a will.
4. Estimate the costs of preparing a legal will.
5. Evaluate the conditions a person should meet to qualify as as administrator or executor of an estate.

Learning activities:

1. Students study a sample will and discuss the contents and terminology.
2. Have an attorney discuss the state laws and the technicalities concerned with legal wills.
3. Class develop a will with respect to the following: validity, content, word usage, signatures, and the naming of and executor.

D. Trusts

Competencies - students will be able to:

1. Define trust and explain how it is formed.
2. Describe the qualities the trustee of a farm business should possess.
3. Describe the differences between a short-term and a lifetime trust.
4. Describe the differences between a trust and a will and how they can fit together.
5. List possible trustees (individuals and institutions).
6. Describe the "spendthrift" clause and the possible need for it in a trust.
7. Explain the possible tax advantages of a trust.
8. Explain why a flexible trust is needed for a farm business.

Learning activities:

1. Students research the purposes and types of trusts and discuss them in class.
2. Class discuss possible trustees for a farm business.
3. Invite a bank trust officer to meet with the class and discuss his experiences with trusts.
4. Using a problem situation, students construct a trust for a farm business (possibly one of the student's farms).

Instructional Aids

1. Building an Insurance Program, Ohio Agricultural Education Curriculum Materials Service, Ohio State University.
2. Insurance from the Farmer's Side of the Fence, film, Iowa State University Film Library.
3. Insurance in Agriculture, A Resource Unit, New York College of Agriculture, Ithaca.
4. Understanding the Law, film, Iowa State University Film Library.
5. Teaching Units in Legal Aspects of Farm Business Management, Teske, Purdue University.
6. Prescription for Safety, film, Iowa State University Film Library.
7. Farm Petroleum Safety, film, Iowa State University Film Library.
8. Hands Off, film, Iowa State University Film Library.
9. Safe Use of Pesticides, film, Iowa State University Film Library.
10. Estate Planning Kit, Illinois Vocational Agricultural Service, University of Illinois, Urban.
11. Chemicals - Keep Locked, slides, Iowa State University Film Library.

Instructional Aids

12. Tractors and Traffic Equal Trouble, slides, Iowa State University Film Library.

EVALUATION

1. Pre-tests and post-tests.
2. Reports describing one or more occupational possibilities in farm business management.
3. Credit source identification and purposes.
4. Filling out credit instruments.
5. Calculating interest rates and costs.
6. Calculating home farm cash flows.
7. Home farm financial plan (budget).
8. Record system terminology identification.
9. Home farm inventory.
10. Calculating methods of depreciation.
11. Investment credit problems.
12. Filling out 1040 and 1040F tax forms.
13. Set up home farm filing system.
14. Formulate a partnership agreement.
15. Diagram a cooperative structure.
16. Design a family corporation.
17. Design a complete farm program for home farm.
18. Structure and methods of farm organizations.
19. Design promotional ideas for farm commodities.
20. "Use" futures markets on home farm.
21. Plan power and machinery needs for home farm.
22. "Finance" a line of machinery.
23. Solving problem involving buying vs. leasing vs. custom as sources of farm machinery.
24. "House" the home farm machinery.
25. Design a home labor schedule.
26. Devise a hired labor incentive agreement.
27. Surveying competence.
28. Land evaluation competence.
29. "Contract" a farm.
30. Formulate home farm insurance coverage.
31. Solve home farm safety problems.
32. Identify laws affecting home farm.
33. Draw up a family will.
34. Construct a family trust.

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2. TEACHER'S GUIDE TO FARM MONEY MANAGEMENT - 1972 - Ohio State University.
3. DETERMINING CREDIT NEEDS ON THE FARM - 2025a - Illinois Vo-Ag Service.
4. PLANNING FOR REPAYMENT OF LOANS - 2026a - Illinois Vo-Ag Service.
5. SOURCES OF FARM CREDIT - 2027a - Illinois Vo-Ag Service.
6. USING CREDIT TO INCREASE FARM EARNINGS - 2024a - Illinois Vo-Ag Service.
7. COOPERATIVES IN BUSINESS - USDA.

8. HOW TO START A COOPERATIVE - USDA.
9. MEASURING COOP DIRECTORS - USDA.
10. WHAT ARE COOPERATIVES? - USDA.
11. FARMER COOPERATIVES...FARM BUSINESS TOOLS - USDA.
12. WAYS FARMERS DO BUSINESS - USDA.
13. THE FARM CORPORATION - PM 273 - Iowa State University.
14. CAPITALISM, SOCIALISM, COMMUNISM - 2038 - Illinois Vo-Ag Service.
15. TOWARDS A LONG-RANGE SOLUTION TO THE COMMERCIAL FARM PROGRAM - FS-1155 - Iowa State University.
16. OUR CAPACITY TO PRODUCE - FS-1264 - Iowa State University.
17. WHICH FARM PROGRAM TO CONTROL OUR OVERCAPACITY - FS-1269 - Iowa State University.
18. FARM POLICIES AND OUR RURAL COMMUNITIES - FS-1335 - Iowa State University.
19. AMOUNT AND COSTS OF ALTERNATIVE LAND RETIREMENT PROGRAMS - FS-1372 - Iowa State University.
20. FARM PROGRAMS, PRICE SUPPORTS AND IOWA FARMS - FS-1376 - Iowa State University.
21. WHAT BARGAINING POWER FOR FARMERS - FS921 - Iowa State University.
22. WHAT FARM EXPORTS MEAN TO THE UPPER MIDWEST - PM342 - Iowa State University.
23. MARKETING AGRICULTURAL PRODUCTS - 2016a - Illinois Vo-Ag Service.
24. HOW PRICES OF MEAT ANIMALS ARE ESTABLISHED - 2032 - Illinois Vo-Ag Service.
25. TRENDS IN LIVESTOCK BUILDINGS - FS1066 - Iowa State University.
26. FACTORS INFLUENCING FARM FIELD COSTS - FS1198 - Iowa State University.
27. LEASING VS, OWNING - FS1371- Iowa State University.
28. CUSTOM RATES PAID - PM521 - Iowa State University.
29. FITTING MACHINERY AND EQUIPMENT TO THE FARM - 2039 - Illinois Vo-Ag Service.
30. FARM LABOR PAY PACKAGES - FS1373 - Iowa State University.
31. PROBLEMS OF HIRING AND KEEPING FULL-TIME FARM EMPLOYEES - FS1380 - Iowa State University.
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33. BALANCING THE LABOR SUPPLY AND THE FARM BUSINESS - 2035 - Illinois Vo-Ag Service.
34. CASH WAGES AND PREREQUISITES RECEIVED - SB438 - USDA.
35. FARM LABOR INPUTS - SB438 - USDA.
36. THE PARADOX OF FARM LABOR - FS1364 - Iowa State University.
37. FARMER'S TAX GUIDE, INTERNAL REVENUE SERVICE NO. 225.
38. FARM MANAGEMENT MANUAL, Standard Oil.
39. FARM BUSINESS PLANNING AND ANALYSIS FILING SYSTEM, 1971, Ohio State University.
40. APPRAISING FARM BUILDINGS - 3017a - Illinois Vo-Ag Service.
41. SOCIAL SECURITY AMENDMENTS - IMPORTANCE TO FARM AND RURAL PEOPLE - Economic Research Service No. 257 - USDA.
42. TIPS FOR TEACHING HEALTH INSURANCE AND LIFE INSURANCE - Educational Division, Institute of Life Insurance.
43. WHAT SHOULD MY INSURANCE COVER - No. 231 - Pennsylvania State University.
44. INSURANCE IN THE FARM BUSINESS - No. 1003 - New York State College of Agriculture.
45. PLANNING FARM PROPERTY TRANSFERS WITHIN FAMILIES IN IOWA - P125 (Revised 1966) Iowa State University.
46. ESTATE PLANNING - Rev. September 1972 - University of Illinois.
47. TEACHING UNITS IN LEGAL ASPECTS OF FARM BUSINESS MANAGEMENT, Purdue University.
48. USING FARM REAL ESTATE LOANS - 2033 - Illinois Vo-Ag Service.

Books:

1. AN INTRODUCTION TO AGRICULTURAL BUSINESS AND INDUSTRY, Weyant, Hoover, and McClay 1971, Interstate.
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3. CAREERS IN AGRIBUSINESS AND INDUSTRY, Stone 1971, Interstate.
4. DOANES DIGEST, Doanes Agricultural Service.

5. PLANNING MACHINERY PROTECTION, No. 402, AAVIM.
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9. FREDDIE COMPUTER, Iowa Farm Bureau.
10. BETTER FARM ACCOUNTING, Howell, 1972, Iowa State University.
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Athens, Georgia 30602

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1920 Waukegan Road
Glenview, Illinois 60025

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8900 Manchester Road
St. Louis, Missouri 63144

4. Farm Credit Banks of St. Paul
St. Paul, Minnesota 55101

5. Felco Land-O-Lakes
Ft. Dodge, Iowa 50501

6. Illinois Vo-Ag Service
College of Agriculture
University of Illinois
434 Mumford Hall
Urbana, Illinois 61801

7. Institute of Life Insurance
277 Park Avenue
New York, N.Y. 10017

8. Internal Revenue Service
Kansas City, Missouri 64106

9. Iowa Beef Producers (Cattleman's) Association
Airport Road
Ames, Iowa 50010

10. Iowa Dairy Association
Ankeny, Iowa 50021

11. Iowa Farm Bureau
507 - 10th Street
Des Moines, Iowa 50309

12. Iowa State University
Media Resources Center
121 Pearson Hall
Ames, Iowa 50010

Publications Distribution Center
Printing and Publications Building
Ames, Iowa 50010

IVATA Instructional Materials
Agri Engineering Department
Iowa State University
Ames, Iowa 50010

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13. Iowa Poultry Association
535 East Lincolnway
Ames, Iowa 50010

14. Iowa Turkey Federation
535 East Lincolnway
Ames, Iowa 50010

15. John Wiley & Sons, Inc., 605 Third Ave.,
New York, N.Y. 10016

16. Kentucky, University of
Lexington, Kentucky 40506

17. Montana State University
Bozeman, Montana 59715

18. NASCO
Fort Atkinson, Wisconsin 53538

19. Nebraska, University of
Lincoln, Nebraska 68508

20. New York State College of Agriculture
Ithica, New York 14850

21. Ohio State University
Curriculum Materials Service
Room 201
2120 Fyffe Road
Columbus, Ohio 43210

22. Pennsylvania State University
Department of Agricultural Education
University Park, Pennsylvania 16802

23. Pork Producers Association
4715 Grand Avenue
Des Moines, Iowa 50312

24. Purdue University
Layfayette, Indiana 47907

25. Soybean Growers Association
Hudson, Iowa 50643

26. Standard Oil Division
American Oil Company
Farm and Home Department
P.O. Box 4040
St. Paul, Minnesota 55116

27. Successful Farming
Meredith Publishers
1716 Locust Street
Des Moines, Iowa 50309

28. United States Department of Agriculture
Publications Division
Office of Information
Washington, D.C. 20250

29. U.S. Department of Health, Education and Welfare
Washington, D.C. 20202

30. Vocational Education Productions
California Polytechnic State University
San Luis Obispo, California 93401

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Agribusiness and Natural
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Curriculum Guide

AGRICULTURAL SUPPLIES AND SERVICES

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SOURCE OF CURRICULUM GUIDES

The following ten curriculum guides in agribusiness and natural resources are available as a set from the Department of Public Instruction:

Agribusiness and Natural Resource Education

Animal Science

Agronomic Science

Agricultural Mechanics

Farm Business Management

Agricultural Supplies and Services

Agricultural Products Processing and Distribution

Horticulture

Agricultural Resources and Conservation

Occupational Experience in Agriculture

Order from Information and Publications Services Section, Department of Public Instruction, Grimes State Office Building, Des Moines, Iowa 50319.

Price: $5.00 per set of ten curriculum guides listed above. Please send remittance with order.

FOREWORD

This curriculum guide is one of ten developed for use by vocational and technical agribusiness instructors in planning instructional programs to meet the needs of their students. Elementary teachers and instructors in other subject matter areas at the secondary level may find the guide of value in introducing principles of career education in their instructional programs. Although much of the material is designed for use at the secondary or post-secondary levels, many of the competencies may be introduced at the awareness or exploratory levels of career education.

Instructors in multiple-man departments at the secondary level and in post-secondary schools may organize nine-week or semester courses around the units and problem areas outlined in this guide.

Appropriate competencies and learning activities have been provided for each problem area. The competencies listed are those determined in previous studies as needed by persons employed in agricultural supply and service occupations. Instructional aids and references are listed for each unit.

A list of titles of occupations requiring competencies in agricultural supplies and services has been included in the guide. It is assumed that only partial attainment of some competencies can be done at the secondary level. The competencies may not be mastered until the student has completed additional preparation at the post-secondary, young or adult class, or collegiate levels. It is assumed that "hands on" and occupational experience will be provided with class and laboratory instruction at all levels.

Evaluation of the instruction in agricultural supplies and services should be based largely upon attainment of the competencies listed in this guide, and on the application of them as students participate in occupational experience programs.

Allocations of units and of instructional time in the four-year sequence of courses at the secondary level are presented in the curriculum guide titled, Agribusiness and Natural Resource Education. Also presented are suggested activities involving agricultural supplies and services for teachers at the kindergarten through sixth grade level, and suggested outlines of subject matter to be included in exploratory programs at the junior high school level.

Curriculum Guide, Agricultural Supplies and Services was prepared by Garland Ashbacher, Agribusiness Chairman, Kirkwood Community College, Cedar Rapids, Iowa.

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Much credit is due the members of a steering committee which met for three sessions in advance of the workshop to determine the areas to be involved and the format to be followed. The following were members of the steering committee:

State Consultant Staff in Career Education - Emeron Dettmann, Gerald Lamers and Elwood Mabon.

ISU Teacher Education Staff - Dr. Harold Crawford, Dr. Bennie Byler, Richard Carter and Dr. Thomas Hoerner.

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OCCUPATIONAL TITLES
AGRICULTURAL SUPPLIES AND SERVICES

Instructional programs based upon content in this guide will prepare individuals for job entry, will upgrade occupational skills, or will prepare the learner for further occupational preparation.

Farm Supply Center Manager
Farm Supply Production Manager
Farm Supply Sales Manager
Farm Supply Service Manager
Farm Supply Office Manager
Farm Supply Company Research and Development Director
Farm Supply Company Fieldman
Farm Supply Center Bookkeeper
Farm Supply Salesman
Farm Supply Serviceman
Farm Supply Applicator
Farm Supply Equipment Operator
Farm Supply Warehouseman
Farm Supply Center Deliveryman
Farm Supply Center Sales Clerk
Farm Supply Center Stock Clerk
Feed Mill Employee
Petroleum and Related Products Route Salesman
Agricultural Chemical Fieldman
Farm Supply Center Worker
Parts Man
Grain Elevator Man
Grain Grader
Grain Inspector
Feed Specialist
Seed Technician
Animal Health Supply Salesman
Veterinarian's Assistant
Pest Exterminator
Pest Exterminator Supervisor
Weed Inspector
Grain Hauling Contractor
Grain Hauler
Custom Pesticide Applicator
Farm Supply Order Clerk
Farm Supply District Salesman
Pet Center Sales Clerk
Warehouse Foreman
Public Relations Specialist
Route Salesman

(Farm supplies include feed, fertilizer, chemicals, seeds, animal health products, petroleum and related products, hardware, lumber, and farm machinery and other equipment.)

AGRICULTURAL SUPPLIES AND SERVICES

GENERAL OBJECTIVES

Students completing instruction in agricultural supplies and services will have:

1. Explored the field of farm supply occupations and made tenative career choices.
2. Developed those attitudes, competencies, and job skills needed for successful job entry or employment in an agricultural supplies and services occupation.

UNITS

Opportunities in Agricultural Supplies and Services
Human Relations
Salesmanship
Business Procedures and Records
Business Management
Product Knowledge of Agricultural Supplies
Business Law

Opportunities in Agricultural Supplies and Services

Problem Areas

A. Feed and grain industry
B. Chemical, fertilizer and seed sales and service
C. Animal health industry
D. Farm equipment, hardware, lumber, petroleum and TBA (tires, batteries, accessories) sales and service

Competencies and Learning Activities

A. Feed and grain industry

Competencies - students will be able to:

1. Recognize those jobs available in the feed and grain industry. Job examples are feed department foremen, counter sales, warehouseman, delivery man, district salesman, elevator assistant manager, feed or seed salesman, grain inspector, office manager, grain buyer, grain grader and feeding specialist.
2. Describe the nature of work, education required, jobs available, advancement opportunities, working conditions, average salary, and fringe benefits of main occupations in the feed and grain industry.
3. Rank job titles in each industry into the following groupings of unskilled, skilled or technical, sales, service, and managerial or foremen.

Learning activities:

1. Students list the feed and grain businesses handling feed and grain in their community.
2. Students survey one or two employers to determine physical and mental job requirements.
3. Two people from local businesses speak to the class concerning the opportunities in feed and grain businesses.
4. Tour a grain elevator to determine the trade area, products handled, personnel policies, volume of business, storage

capacity, and qualifications desired in employees. If possible, students should take man lift to the top of the elevator.

5. Write to the Iowa Department of Agriculture to determine the feed companies listed by tonnage sold in Iowa and the United States.
6. Survey the storage capacity of a grain elevator and estimate the dollars represented in storage costs.

B. Chemical, fertilizer and seed sales and service

Competencies - students will be able to:

1. Discuss the occupations available in the industry. Job examples are plant manager, plant operator, department foreman, fieldman, salesman, service man, delivery man, production foreman, field advisor, custom pesticide applicator, custom fertilizer applicator, and seed technician.
2. Explain the nature of work, education required, jobs available, advancement opportunities, working conditions, average salary, and fringe benefits in the chemical, fertilizer, and seed sales and service industry.
3. Students will rank industry jobs into the groupings of unskilled, skilled or technical, sales, service, and managerial or foreman.

Learning activities:

1. Students study community and locate the concerns that handle chemicals, fertilizer, and seeds to determine the types and volumes handled.
2. Students interview a farmer to determine the dollar costs per acre of chemicals, fertilizers, and seed used and the expected cost five years hence.
3. Students determine the different kinds of jobs performed by employees in this type of business.

C. Animal health industry

Competencies - students will be able to:

1. Identify those occupations in the wholesale, retail, and service aspects of the animal health industry. Job examples are warehouse man, wholesale or retail salesman, order clerk, pet center sales clerk, district salesman, warehouse manager, and veterinarian's assistant.
2. Select an occupation in animal health and report on the nature of work, education required, jobs available, advancement opportunities, working conditions, and average salary and fringe benefits.

Learning activities:

1. List the animal health products sold.
2. Ask a animal health industry employer to discuss what he thinks are the most important factors involved in successful employment.
3. Construct a chart showing the jobs performed, training and experiences required for job entry, pay, benefits, and the physical requirements of an animal health job.

D. Farm equipment, hardware, lumber, petroleum, and TBA sales and service

Competencies - students will be able to:

1. Explain those jobs available in lumber yards, hardware, farm equipment, petroleum, tires, batteries, and accessories businesses in the school district service area. Some examples of these sales and service jobs are route salesman, sales clerk, petroleum specialist, farm service center manager, salesman, short line equipment fieldmen, lumber yard foreman, public relations specialist, product fieldman, plant maintenance man, implement parts man, implement company representative.
2. Report on the nature of work, education required, jobs available, advancement opportunities, working conditions, average salary and fringe benefits of two of the jobs listed in which the student is most interested.
3. Rank industry jobs into the groupings of unskilled, skilled or technical, sales, service, and managerial or foreman.
4. Detect the dollar volume of lumber, hardware, farm equipment and petroleum sold in the school service area, or in the state.

Learning activities:

1. Estimate the building cost of a farm and town supply store.
2. Estimate the "inventory on shelves" investment of a farm and town supply store.
3. Construct a chart showing the inter-relationships of jobs in this business and how they relate to the farmer.
4. Consult the Dictionary of Occupational Titles and report what is found about five jobs in this occupational area.
5. Students name three jobs in Agricultural Supplies and Services which most interest them and explain why they are interested.
6. Students compute weekly gross and take-home pay from problems given by the instructor. Also calculate overtime pay.
7. Prepare a job description of the work they are doing in a part-time job, past summer's work, or a job they previously had.

Instructional Aids

1. Oklahoma Vocational Agriculture Education, Basic Core Curriculum I and III. Oklahoma State Department of Vocational and Technical Education.
2. Applying for a Job - slidefilm, Illinois Vocational Agriculture Service.
3. Careers in Farm Supplies - slidefilm with script, California State Polytechnic College.
4. Careers in Farm Services - slidefilm with script, California State Polytechnic College.
5. Hank Wilson, Salesman - slidefilm with record; Ralston Purina Company.
6. All Jobs are Important - filmstrip and record, Kent Feed Company.
7. Tomorrow Can't Wait; A Challenge for Tomorrow's Manager; Management from Yesterday to Tomorrow; and Hiring a Grain and Feed Employee - cassettes from series of 16 called, "Voice of Profit"; Iowa Grain and Feed Association.
8. A Step Ahead - 16 mm. movie, New Holland Dealer.
9. Dynamic Careers Through Agriculture, 16 mm. movie, Farm Film Foundation.

10. Career Folders, Ohio State University.
11. Curriculum Guide for Agri-Business Occupations in Minnesota, Area Vocational School, Staples, Minnesota.

Human Relations

Problem Areas

- A. Importance of human relations
- B. Know yourself
- C. Developing self confidence
- D. Setting clear goals
- E. Making decisions
- F. Job relations with superiors and fellow workers
- G. Influencing people
- H. Etiquette

Competencies and Learning Activities

A. Importance of human relations

Competencies - students will be able to:

1. Recognize those personality traits necessary for successful employment.
2. Determine those ten most important factors related to job success.
3. Identify ways of selling himself to others in the world of work.

Learning activities:

1. Using the teacher as an example, the class will list the personality traits he has which might contribute to failure.
2. Students give examples of situations they have seen where employees were fired because of poor human relations.
3. Interview businessmen and determine which human relations factors they consider important for job success.

B. Know yourself

Competencies - students will be able to:

1. Identify their desirable and undesirable personality traits.
2. Identify the five essential job success personality traits.
3. Explain what makes us what we are.
4. Recognize those personal needs which affect behavior.
5. Detect excuses people use and ways people escape from themselves.
6. Describe his own philosophy of life.

Learning activities:

1. Students discuss each other's personality traits.
2. Students take "Inventory of Your Personality" test.
3. Consult with counselor in the administration or interpretation of results from a vocational interest test.
4. Students list goals they have set for themselves and compare if they are realistic according to their interests, abilities, and opportunities.
5. Students will write out the things or values they believe in.

C. Developing self-confidence

Competencies - students will be able to:

1. Assess those physical traits which keep people from presenting a good physical appearance and, hence, hurt their personalities.
2. Recognize the importance of self-confidence.
3. Demonstrate those guidelines which increase self-confidence.
4. Give and take constructive criticism with the intent of improving the individual.

Learning activities:

1. Students use one of the guidelines which increase self-confidence and report back to the class what happened.
2. Students relate situations in athletics where an increase or lack of self-confidence would have won or lost a game.
3. Students describe individuals they know who exhibit or lack self-confidence.

D. Setting clear goals

Competencies - students will be able to:

1. Recognize the different achievement levels of setting goals, such as 100% chance of reaching, 50% chance of reaching, or 10% chance of reaching.
2. Formulate short term and long term goals.
3. Explain why and how we might change our goals.

Learning activities:

1. Students write their one, five, and ten year goals based on their interests, abilities, and opportunities.
2. Each student selects a goal to jump a specific height and determine how close he comes to reaching it.

E. Making decisions

Competencies - students will be able to:

1. Make a decision using the method of listing the advantages and disadvantages of a decision and make a choice of using the scientific method in decision making.
2. Recognize those factors which affect a decision after it has been made.

Learning activities:

1. Students tell the decisions they have made since they got up; such as, what clothes they put on and what they ate.
2. Students pick a decision they have to make and write out the decision using the suggested steps.

F. Job relations with supervisors and fellow employees

Competencies - students will be able to:

1. Determine personality qualities employees desire most in supervisors and co-workers.
2. Detect those employer expectations of his employees, such as, regular attendance, punctuality, dependability, and job attitudes.

3. Build good co-worker relationships by such things as not passing the buck, complimenting, accepting suggestions, enthusiasm, responsibility, and respect for others.
4. Demonstrate effective use of the telephone.

Learning activities:
1. Students design a form and survey an agribusiness for those human relations factors associated with specific competencies.
2. Students discuss case studies of business human relations problems.
3. Students use "Teletrainer" from the Bell Telephone Company.

G. Influencing people

Competencies - students will be able to:
1. Identify human salesmanship techniques used in influencing people.
2. Relate ways in which people influence you.
3. Select ways to gain cooperation from others.
4. Recognize those situations when you should avoid arguing or saying something important to a person.
5. Demonstrate an informative speech evaluated on voice loudness, distinctness, vocal variety, audience eye contact, organization and originality.
6. Write proper job instructions, messages and short business letters.
7. Give oral job instructions.

Learning activities:
1. Write a letter to a friend, parent, or relative praising them for something they have done for you.
2. Choose one of the ways of gaining cooperation from others, apply it, and report to the class how it worked.
3. Students role play situations where they are attempting to influence others.

H. Etiquette

Competencies - students will be able to:
1. Define and recognize the importance of etiquette.
2. Make and respond to introductions.
3. Determine the major points to remember associated with table manners.

Learning activities:
(an exchange class with the Home Economics teachers is a possibility)
1. Students role play in making introductions.
2. Students role play desirable and undesirable handshakes.
3. Students write up situations on slips of paper indicating examples of poor table manners. They then draw from these slips and role play how they would react or handle the situation.

Instructional Aids
1. Human Relations. IVATA Instructional Materials Packet.
2. Success for You - 6 cassette tapes. Goals Unlimited, Inc.

3. Personality - transparancies. IVATA Instructional Materials Packet.
4. Oklahoma Vocational Agriculture Education, Basic Core Curriculum III. Oklahoma State Department of Vocational and Technical Education.
5. Second Effort - 16 mm. Soundfilm. Kent Feed Company.
6. Teletraining Unit - Bell Telephone Company.
7. A Manner of Speaking, Thanks for Listening, and If an Elephant Answers - 16 mm. Soundfilm. Bell Telephone Company.
8. How to Motivate Your Employees - Cassette from "Voice of Profit" series, Iowa Grain and Feed Association.
9. Curriculum Guide for Agri-Business Occupations in Minnesota, Area Vocational Technical School, Staples, Minnesota.

Salesmanship

Problem Areas

- A. Selling in our American economy
- B. Characteristics of a salesman
- C. Locating and approaching customers
- D. Finding the customer's need
- E. Presenting the product
- F. Handling customer's objections
- G. Closing the sale
- H. Organizing the selling effort

Competencies and Learning Activities

A. Selling in our American economy

Competencies - students will be able to:

1. Explain the importance of sales to the American economy.
2. Evaluate the contributions a salesman makes to the business. Contributions to be evaluated are: increasing profits, holding present customers, securing new customers, building store traffic, encouraging broader product use, credit and collection assistance, building good will, inventory control, assuring steady profit, and work.
3. List and explain the types of sales positions.
4. Define the term "good selling."
5. Determine post education situations where salesmanship competence will be beneficial.

Learning activities:

1. Explain how democracy promotes the need for salesmanship.
2. List the advantages and disadvantages of a sales career.
3. Students give examples of good and poor sales methods they have observed.
4. Estimate the percentage of all workers in the United States who owe their employment, at least in part, to contributions of salesmen.
5. Compare famous salesmen with famous statesmen and determine their contributions to the growth of the United States.
6. Name products purchased during the past week from sources other than vending machines.

B. Characteristics of a salesman

Competencies - students will be able to:

1. Assess the personal and moral traits essential for success in selling.
2. Determine the mental qualities of a successful salesman.
3. Select the appearance traits and social graces needed in a sales career.
4. Define maturity and explain its importance in selling.

Learning activities:

1. Students bring to class examples of good and poor selling techniques throughout the time salesmanship is studied.
2. Students demonstrate high energy level or enthusiasm in a class activity.
3. Students role play desirable and undesirable personality and appearance traits and social graces.
4. Students take "Self-Analysis of Interest in Sales Work" test and determine their individual scores.
5. Students discuss whether they are individually an introvert or an extrovert, and which would contribute most to being an effective salesman.
6. Name people known by other students who are sincere and tell why they feel that they are sincere.

C. Locating and approaching customers

Competencies - students will be able to:

1. Analyze the following ways of locating prospects through personal observation and inquiries: newspapers, observation of farms in the territory, records of calls at the farm supply store, and inquiries to identify outstanding farmers, feeders, and grain producers.
2. Apparise social contacts, such as: service clubs, community organizations, names of prospects from those called upon and cold canvass as techniques for locating prospects from contacts in the community.
3. Qualify prospects as to their authority to buy, financial capacity, and having a satisfactory credit rating.
4. Compare ways of greeting the customer and creating a climate for doing business.
5. Demonstrate methods of gaining a customer's attention.

Learning activities:

1. Practice methods of remembering names and pronouncing them correctly.
2. Students describe how they meet new people.
3. Students in groups of two to four attend specific community meetings for the purpose of compiling a list of prospective customers for a farm supply center. Assume the roles of salesmen, discovering the potential customers without divulging the purpose. Each student reports the experience and presents a list of prospects, giving pertinent data about each.
4. Students examine newspapers circulated in the area served by the school, and list prospective customers for the farm supply

center which may be gleaned from them. Write plans for contacting these prospects, explaining the method of making the contacts and presenting the material to be used. For example, if letters or telephones are used, include a plan of what is to be said.

5. Demonstrate and practice a proper hand shake.
6. Take a field trip to observe people working who have to meet customers as part of their job.
7. Role play "meeting the customer."
8. Select and demonstrate the proper methods of greeting the customer.
9. Demonstrate correct ways of gaining the customer's attention.
10. Invite a successful sales person to speak to the class on importance of selling, characteristics of a salesman, and locating and approaching customers.

D. Finding the customer's need

Competencies - students will be able to:

1. Arrange the sales interview considering making and keeping appointments, initial objectives of the interview, first impressions, introductions, and topics to avoid.
2. Determine motivational aspects of buyers considering classification of motives, variation among buying motives, needs and wants of buyers, differences between suspects and prospects, consumer habits, and emotional and rational appeals.
3. Plan which, why, and how questions to accurately determine the customer's problem situation and need.

Learning activities:

1. Invite a successful farmer to discuss his relationships with a salesman to the class.
2. Students select a product and farm situation and write need development questions.
3. Select a list of items commonly sold in a farm supply center in a locality. Indicate for each item the motive which would dominate in causing a customer to purchase the item.
4. Visit a local store. Without interfering, try to identify and record the motives that prompted customers to buy.
5. Prepare a demonstration to show how to appeal to a customer who would be motivated by the "ease and convenience" motive, the "safety" motive, or the "profit" motive.

E. Presenting the product

Competencies - students will be able to:

1. Explain the importance of product knowledge.
2. Evaluate manufacturers, wholesalers, retail outlets, libraries, media, labels, competition, and publications as sources of product information.
3. Assess what a salesman should know about the product he handles.
4. Lay out a product demonstration using techniques in demonstrating, products, services, and pitfalls.
5. (See Agricultural Supplies and Services unit on Product Knowledge.)

Learning activities:

1. Students select a product and demonstrate the use of the product, how the product works or is used, what the product is made of, how the product is made, instructions for using, who is the manufacturer, storage of product, maintenance if not consumable, and packaging (sizes and material).
2. Students bring feed tags, chemical labels, and seed tags to class and discuss product information.
3. Invite a successful salesman to class to discuss presenting the product.
4. Explain at least three important facts a salesman should know about his company.
5. Discuss self-confidence in selling and how it relates to product knowledge.

F. Handling customer's objections

Competencies - students will be able to:

1. Distinguish between an objection and an excuse.
2. Determine why customers offer objections.
3. Describe the types of objections.
4. Anticipate objections.
5. Recognize the value of objections.
6. Answer objections.
7. Engage in the handling of customer complaints.

Learning activities:

1. Students demonstrate the various methods of handling objections, such as the "yes, but....." method.
2. Students prepare a customer testimonial.
3. Students develop a visual aid designed to overcome objections.
4. Students complete feeding, fertilizer, or chemical comparison data to be used as "proof" in overcoming objections.
5. Role play situations showing how "proof" would be used in a sales presentation.
6. Students list a reply to the following objections concerning a product:
   (a) The price is too high.
   (b) This color will not go with what I have.
   (c) Are you sure this will work?
   (d) Is this one as good as that one?
   (e) Doesn't this come in a smaller can?
   (f) What will happen if this stops running?

G. Closing the sale

Competencies - students will be able to:

1. Assess the methods of closing a sale.
2. Recognize customer buying signals and attitudes.
3. Identify closing difficulties.
4. Appraise the different closing techniques.
5. Demonstrate sales of related items.
6. Plan a method for making return customer calls.

Learning activities:

1. Students ride with a salesman for one or more days.

2. Invite a successful salesman to class to present the steps in making a sale.
3. Students give a complete sales presentation, using all the steps in making a sale. Have teacher, class member, or outside person act as a customer. Sell a product or a program.
4. Class list several statements that could be used to close a sale.
5. After each sales presentation, the students analyze the demonstration and offer suggestions for improvement.
6. Students role play in a situation of handling a customer complaint.
7. Students giving sales presentations should at least be tape recorded and, if possible, use a video-tape.

H. Organizing the selling effort

Competencies - students will be able to:

1. Lay out a weekly schedule of activities for a salesman under a given situation.
2. Keep the necessary sales records.
3. Review the salesman's selling efforts.
4. Set sales goals.
5. Analyze sales competition considering the salesman's attitudes toward, knowledge of competitors, what he says to his customers about them, and product comparison.

Learning activities:

1. Students bring to class examples of records salesmen have to keep.
2. Identify the characteristics of the potential customer on which a salesman could capitalize in making a sales approach. Prepare a brief analysis of the customer and explain why the product could be sold to him.
3. Students plan sales schedules for one week.

Instructional Aids

1. The Importance of Selling - 16 mm. film, Encyclopedia Britannica Films.
2. Of Time and Salesman - 16 mm. film, Movies USA, Inc.
3. Second Effort - 16 mm. Soundfilm, Kent Feed Company.
4. The Customers Shoes; The Customers Shoes at Home; How to Start a Sale; Who's on First; What's on Second; I Don't Know; and How to Ask for the Order - Slidefilms with record or cassettes; Ralston Purina Company.
5. In Store Salesmanship - 25 minute cassette, Iowa Grain and Feed Association.
6. Selling Feed Today - filmstrip with cassette tape, Kent Feed Company.
7. Customer Contacts....How to Win More Friends for Yourself and Your Company - five filmstrips, Kent Feed Company.
8. Manpower Development Program - six filmstrips, Kent Feed Company.
9. Modern Salesmanship - Home Study Programed Materials, Farmland Industries.
10. Salesmanship - Individual Instruction Manual, University of Missouri.

11. Salesmanship in Agricultural Businesses - colored slidefilm, Illinois Vocational Agriculture Service.

Business Procedures and Records

Problem Areas
- A. Basic mathematics
- B. Making change
- C. Use of the cash register
- D. Handling the money from sales
- E. Sales tickets
- F. Figuring discounts and taxes
- G. Pricing merchandise
- H. Business machines

Competencies and Learning Activities

A. Basic mathematics

Competencies - students will be able to:
1. Relate the importance of mathematics to agricultural supply and service occupations.
2. Demonstrate acceptable mastery of addition, subtraction, multiplication, and division using arithmetic skills in decimals, fractions, percentages, and area. Arithmetic skill based on speed, accuracy, and legibility.
3. Compute addition answers mentally for one and two columns of figures.
4. Compute multiplication answers mentally for a series of problems.
5. Compute division answers mentally for a series of problems.

Learning activities:
1. Students take pre-test to determine ability to solve written problems which occur on the job.
2. Students determine the affect customers' complaints have regarding errors on employee's succeeding on the job.
3. Survey a business to determine the incidence of common types of errors. Examples are poorly written number, misplaced decimal point, disorderly columns of figures, transposing figures (54 for 45), and failure to check figures.

B. Making change

Competencies - students will be able to:
1. Demonstrate the importance of making correct change.
2. Make change according to the addition method.
3. Apply correctly the principles in making change.

Learning activities:
1. Each student should take the part of a cashier and make change. Other students act the part of customers. Vary amounts of sales using $10 or $20 as amount of customer's money. Use real money.
2. Students make change while being tape recorded and play back the tape.

3. Students demonstrate situations where customer might say, "I have the pennies," as in $7.03 sale out of $20.00.

C. Use of the cash register

Competencies - students will be able to:

1. Illustrate the money arrangement system in a cash register.
2. Identify parts of a cash register beginning students should know.
3. Discuss functions of a cash register.
4. Relate the printing mechanism of a cash register.
5. Operate a cash register.

Learning activities:

1. Field trip to a supermarket or store to observe the use of a cash register.
2. Discuss functions of register and experiences students have had at supermarkets, theatres, and other businesses using the cash register.
3. Students operate a cash regisister.
4. Students audit cash register print out with change in the cash register.

D. Handling the money from sales

Competencies - students will be able to:

1. Explain the importance of checking the daily cash balance of the business.
2. Apply the formula for checking daily cash balance to common business problems.
3. Write checks correctly.
4. Determine policy concerning examination and acceptance of checks.
5. Review the kinds of check endorsements.
6. Endorse checks correctly.
7. Fill out a bank deposit slip correctly.
8. Apply the formula for checking the monthly bank statement against the company books.

Learning activities:

1. Students bring to class and discuss personal monthly bank statements.
2. Invite banker to discuss correct check writing procedures, bank deposit slips, and monthly bank statements.
3. Students calculate daily cash balance and check the daily cash balance against the company books problems.

E. Sales tickets

Competencies - students will be able to:

1. Illustrate the importance of making sales tickets for merchandise.
2. Describe the common mistakes made when preparing sales tickets.
3. Explain the proper method of filling out a sales ticket.
4. Fill out sale tickets from information given by the instructor.
5. Fill out a sales ticket from a machinery parts list.

Learning activities:

1. Students bring examples of desirable and undesirable completed sales tickets from local businesses.
2. Work problems concerning totaling quantities of items listed at unit prices.
3. Show the price of an item after quantity and cash discounts are deducted.
4. Work problems showing the sales price when quantity and unit prices are given.
5. Students fill out sales tickets in an actual business operation.

F. Figuring discounts and taxes

Competencies - students will be able to:

1. Compute sales tax from an Iowa sales tax chart.
2. Distinguish those products on which sales tax is paid on and those products that are not taxed.
3. Calculate cash, tonnage, and early season discounts.
4. Figure grinding, shelling, delivery, and labor charges using common rates in a farm supply business.
5. Calculate machinery rent charges.
6. Fill out a scales ticket properly.

Learning activities:

1. Students obtain grinding, shelling, trucking, labor or service charges, and machinery rent rates from local businesses and compare in class.
2. Students list and explain why a farm supply business must charge for his services and the reasons for the various dollar amounts.
3. Bring scales tickets from local businesses to class.

G. Pricing merchandise

Competencies - students will be able to:

1. Identify the overhead costs in a business. Some examples are interest, insurance, warehouse storage, theft, labor and depreciation.
2. Distinguish the merchandising cost of doing business, such as advertising, sales commissions, cost of displaying inventory, and telephone costs.
3. Explain how prices for merchandise are determined considering the general price level, price cycles, index numbers, and purchasing power.
4. Assess supply and demand, seasonal variations, government participation, presence or absence of organized market, number of items sold, and competition as to their effect on wholesale and retail merchandise prices.
5. Use mark-up tables.
6. Mark merchandise when markup percentage is calculated on selling price of goods sold and cost of goods sold.

Learning activities:

1. Obtain a financial statement from a business and compute the operating cost percentages.
2. Explain several reasons for variation in markups.

3. Explain why larger businesses operate on a lower profit margin.
4. Compute selling price when using cost of goods sold and retail price as a markup base.
5. Bring empty boxes, bags, and cans of merchandise to use in marking practice.
6. Invite a feed, fertilizer, chemical, or animal health business man to the class to explain pricing techniques.
7. Price products in an actual business operation.
8. Obtain plastic slide rules from businesses (groceries) to show how to obtain selling price.

H. Business machines

Competencies - students will be able to:

1. Operate the ten-key adding machine, using the touch method with speed and accuracy.
2. Operate the portable electronic calculator, using the touch method, with speed and accuracy.
3. Operate office calculators with speed and accuracy.

Learning activities:

1. Suggest that this be done by or in cooperation with the school business department.
2. Students operate these machines in an actual business situation.

Instructional Aids

1. Sales tickets of local businesses.
2. Iowa Sales Tax Rates Chart, local business.
3. Cash register, office supply store or cash register company.
4. Adding machines, calculators, and electronic calculators.
5. Scale tickets of local elevator.
6. Curriculum Guide for Agri-Business Occupations in Minnesota, Area Vocational Technical School, Staples, Minnesota.
7. Sales ticket machine.
8. Merchandising - Individual Instruction Study Guide, University of Missouri.

Business Management

Problem Areas

A. Business terminology
B. Business organization and personnel policy
C. Inventory control
D. Customer credit control
E. Advertising and promotion
F. Agricultural merchandise display
G. Agricultural business filing systems
H. Business money management
I. Basic double entry bookkeeping
J. Simplifying work in an agriculture business

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Competencies and Learning Activities

A. Business terminology

Competencies - students will be able to:
1. Use business terminology in business communications.
2. Define and interpret words and terms used in business. Examples are: list price, journal, merchandising, turnover, F.O.B., dealer inventory control, assets, ledger, terms, voucher, budget, wholesale price, and net worth statement.

Learning activities:
1. Students develop a crossword puzzle using business terms and their definitions.
2. Students and teachers use business words and terms throughout the discussion of this unit on business management.

B. Business organization and personnel policy

Competencies - students will be able to:
1. Explain need for businesses organization.
2. Appraise the four ways that companies are organized to do business (private ownership, partnerships, general corporations, cooperative corporation).
3. Assess the four ways of doing business as to the advantages and disadvantages of each method, capital requirement and division, how controlled, and characteristics.
4. Identify the chain of authority in business organization.
5. Draw an organizational chart of a business.
6. Illustrate employer obligations to employees which are social security, minimum wages, unemployment insurance, workmen's compensation, and compliance with safety regulations.
7. Explain employee incentives such as group life insurance, health and accident insurance, pension plans, employee discounts, vacations, recreational activities, bonuses, commissions and profit sharing plans.
8. Describe a system for promoting, transferring, and terminating employees. Items which should be considered are evaluation of performance, growth through in-service training, promotion and advancement policies, assignment of appropriate job within the organization, and employee association contracts.

Learning activities:
1. Students discuss the chain of command in the school system. Explain the duties of each person in the chain.
2. Prepare a chart of the four ways of doing business, comparing the features of who owns the business; how is voting conducted; who manages the company; who gets the profits; how are profits distributed; and how taxes are paid.
3. Prepare charts of the three common types of organizational patterns which are:
    a. the wheel pattern
    b. the line or military pattern
    c. the line and staff pattern

4. Develop a list of characteristics and responsibilities that students would expect if they had someone working for them.
5. Through class discussion, students identify as many of the in-service training programs that are available to anyone in the community.
6. Describe the differences and similarities among employer-employee, teacher-pupil, and father-son relationships.
7. Students relate any incentive gifts they have received from parents or someone else for attaining a standard or goal such as honor roll in school, winning an FFA contest, or scoring a touchdown in a football game.
8. Class form a labor relations board and role play employee incentive plans. Use simulated problem situations, FFA chapter program of work, or actual job situations.
9. Students survey a business to determine company personnel policies. Class develop a survey form to use.

C. Inventory control

Competencies - students will be able to:

1. Recognize the importance of inventory control and what happens to the business when merchandise is over- or understocked.
2. Describe methods of controlling inventory including: purchase systematically, checking inventory, counting inventory, warehousing, inventory turnovers, inventory costs, and avoiding lines of merchandise that compete with each other.
3. Fill out a purchase order.
4. Complete a receiving record.
5. Interpret and fill out an invoice.
6. Interpret a bill of lading.
7. Inspect merchandise.
8. Take a physical count inventory.
9. Keep a perpetual inventory.
10. Identify the procedures for properly stocking inventory on a shelf.

Learning activities:

1. Visit two or three local agricultural businesses to observe type of inventory system used. Try to get examples of perpetual and physical inventory forms.
2. Students prepare an inventory of a business situation from a class problem and go through the proper procedure resulting in a complete inventory with prices.
3. Students take a physical inventory of shop equipment, classroom equipment, farm equipment, actual operating business equipment, or all items owned by the FFA chapter.
4. Students fill out a purchase order for some item, or items, needed by the educational institution.
5. Visit a local business of an agricultural nature and observe the procedure in use when merchandise is delivered to the firm from the supplier. Observe if a bill of lading is used by the firm transporting the merchandise. Check also to see that there is an invoice form of a past shipment and see how it compared with other forms studied.

D. Customer credit control

Competencies - students will be able to:

1. Explain how the credit policies of a company affect its business.
2. Explain the factors which are considered in determining credit risk.
3. Formulate the procedure used to determine a customer's credit rating.
4. Compare the types of available consumer credit.
5. Appraise the business's cost of extending customer credit.
6. Compute interest charges.
7. Assess the practices in handling accounts receivable.
8. Describe accounts receivable collection procedures.
9. Write credit collection letters.
10. Review the Truth-in-Lending Act.

Learning activities:

1. Field trip to credit bureau or credit collection agency to determine their records, reporting, and credit collection policies.
2. Students plan a customer credit control system.
3. Compare the needs for operating capital on a farm in 1973, compared to that of a farm ten years ago.
4. Students review the business policies and credit procedures of firms where they are employed.
5. Simulate a board of directors meeting of class members in which they set up the credit policies of a company.
6. Role play the situation of a salesperson and a customer with a poor credit rating.
7. Role play a salesperson attempting to collect an unpaid account from a past or present customer.
8. Each student develop a procedure which may be used for collection of a bill.

E. Advertising and promotion

Competencies - students will be able to:

1. Discuss the purposes of advertising.
2. Calculate the costs of different kinds of advertising.
3. Assess newspapers, radio, television, magazines, billboards, and direct mail as to their effectiveness in promoting an agricultural product. Determine the advantages and disadvantages of each.
4. Recognize the principles of customer motivation as they are used in preparing advertising.
5. Plan an advertising budget for a sample agribusiness.
6. Write a newspaper ad.
7. Prepare a radio spot announcement concerning an agricultural product.
8. Plan a one-year advertising calendar for an agricultural business firm.
9. Design a direct mail folder to be sent to the customer to advertise a feed or animal health product.
10. Students obtain a published rate card from closest newspaper, radio, or TV station.

Learning activities:

1. Take a field trip to the advertising department of a newspaper or radio. Each student should write a report on the trip covering such areas as the value of advertising to a retailer; the costs involved and the returns expected; and what constitutes an effective advertisement.
2. Students bring advertisement of agricultural products to class; class members and instructor evaluate them.
3. Students write headlines, sub-headings, and copy for ads using examples of the 12 most persuasive words listed in the subject matter.
4. Prepare a sample advertisement for an FFA fund-raising program.
5. Students make a sample layout of an ad for a local retailer, advertising an item used in agriculture and present it to the class or the retailer for evaluation.
6. Write a form letter for advertising.
7. Prepare an advertisement for an actual business situation.
8. Students conduct a market survey.

F. Agricultural merchandise display

Competencies - students will be able to:

1. Identify the importance of properly displaying merchandise.
2. Evaluate the elements of an effective display which are cleanliness, balance, color harmony, simplicity, dramatization, clear price identification, provision for related selling, and adequate, appropriate, and available merchandise.
3. Design a window display. Study types, mass displays of a single article, serial displays, situation displays, educational displays, public service displays, and their uses in agricultural businesses.
4. Recognize counter, platform, shadow box, base, and blow-up types of interior displays.
5. Appraise spot, fluorescent, incandescent, recessed, and illuminated panel lighted interior displays.
6. Judge display backgrounds using the criteria of simplicity, coordinated color, partially enclosed, closed, and full view.
7. Describe display materials.
8. Plan a merchandise display which coordinates with the window display, directs customer easily to the department, provides for related selling, and provides for customer "self selection."
9. Maintain the merchandise display.

Learning activities:

1. Bring empty cartons, boxes, bags, and cans of agricultural products to class to be used in setting up a display.
2. Discuss examples of good and bad product displays students have seen.
3. Create a display depicting a local FFA chapter activity.
4. Each student will construct a merchandise display.
5. Arrange a window display in the classroom.
6. Each student be in charge of the magazine display cabinet or shelf in the classroom for one week.
7. Maintain the classroom shelves, cabinets, and other areas in such a condition that it will impress visitors.

8. Visit local businesses to evaluate their displays and report back to class.
9. Students photograph desirable business displays and place in notebook with descriptions of these displays.

G. Agricultural business filing systems

Competencies - students will be able to:
1. Illustrate the importance of keeping an organized filing system.
2. Propose guidelines for a filing system.
3. Select containers for file materials. Examples are file drawers with manilla folders, notebooks, and shelves.
4. Design a filing system for an agricultural business.
5. Identify different types of filing systems.

Learning activities:
1. Students assemble as many types of filing systems as possible.
2. Each student set up a personal notebook or manilla folder filing system which is evaluated by the instructor.

H. Business money management

Competencies - students will be able to:
1. Explain the following credit instruments: checks, drafts, promissory notes, secured transactions, warehouse receipts, bills of lading, releases, and satisfactions.
2. Recognize the sources of agricultural credit.
3. Interpret fire and extended coverage, motor vehicle, liability, life, workmen's compensation, and group employee insurance plans.
4. Apply state and federal income tax information in completing personal income tax forms.
5. Describe real estate tax regulations.
6. Interpret a financial statement, explaining the parts of the statement of operations and the balance sheet.
7. Distinguish business financial soundness and methods for measuring it.
8. Calculate ownership equity ratios and current ratios in measuring financial soundness.
9. Calculate receivables turnover ratios.
10. Depreciate business buildings and operating equipment.
11. Identify those complete income and expenses incurred in an agricultural business.
12. Propose a complete income and expense budget for a farm supply business.

Learning activities:
1. Bring examples of credit instruments to class.
2. Students compare sources of credit by inviting representatives of agriculture lending agencies to speak to the class.
3. Insurance company representatives speak to the class.
4. Fill out a personal income tax form.
5. Examine the financial statements on company year-end reports.
6. Students assume they are employed in a local farm supply center. Prepare an insurance program for the manager stating the amount

of protection to be carried, the cost of the insurance, and the major provisions of the recommended policies.

7. Prepare a presentation to the manager showing estimates of additional capital, labor, and facilities needed to add a service or related item for the public. Use records of sales by departments or inventory turnover or both to support the need for the added service or item. Present facts the manager would need to help reach a sound decision.
8. Prepare a year's budget for the FFA chapter.

I. Basic double entry bookkeeping

Competencies - students will be able to:

1. Apply the principles of double entry bookkeeping.
2. Recognize the effect of income and expenses in the bookkeeping system.
3. Enter assets, liabilities and owner's equity in "T" accounts.
4. Enter income and expense accounts.
5. Complete entries in the balance sheet and in the income statement .
6. Make entries in the general journal and ledger.
7. Prepare a trial balance.
8. Close the ledger.
9. Apply bookkeeping procedures by making the appropriate entries in the sales journal, purchases journal, cash receipts journal, cash disbursements journal, accounts receivable ledger, and accounts payable ledger.

Learning activities:
(Note: This is a very demanding unit and the teacher should either plan to spend at least 36 hours on this problem area or not do it at all. This course could probably be taught through the business department.)

1. Students use sample problems and make bookkeeping entries appropriate to the competencies listed.

J. Simplifying work in an agriculture business

Competencies - students will be able to:

1. Explain the work simplification procedure.
2. Analyze the charts which can be used for studying various jobs in an agricultural business.
3. Illustrate work simplification in a store or business.
4. Calculate a partial budget to determine the point of increased returns when it pays to invest in labor-saving equipment.

Learning activities:

1. Students estimate, through class discussion, the time wasted through employee meaningless conversation during an eight-hour day.
2. Students practice the procedure of limiting gossip and meaningless conversation to five minutes per conversation.
3. Students prepare a time and labor study of one man in a farm or farm supply center for a one-day or one-week period.
4. Students plan a one-day to one-week work schedule for one man in a farm or farm supply center business.

Instructional Aids

1. Problems and Working Papers for Bookkeeping Fundamentals, McGraw Hill Book Company.
2. Customer Credit Control - Management guide, Farmland Industries.
3. Inventory Control - Management guide, Farmland Industries.
4. Dictionary of accounting terms, Southwestern Publishing Company.
5. Agricultural Filing - Lesson plan, Kirkwood Community College.
6. Window Display - transparency, DCA Educational Products, Inc.
7. Window Display Arrangements - transparency, DCA Educational Products, Inc.
8. Serial Display - transparency, DCA Educational Products, Inc.
9. Single-promotion Display - transparency, DCA Educational Products, Inc.
10. Ensemble Display - transparency, DCA Educational Products, Inc.
11. Business Owners in the Marketing Structure - transparency, DCA Educational Products, Inc.
12. A Guide for Teaching Advertising, University of Minnesota.
13. Classified: America's Market Place - Soundfilm, Copy production distribution center.
14. Color College - Soundfilm, Eastman Kodak Co.
15. Whatever Happened to Mrs. Momiyana - Soundfilm, Modern Talking Pictures.
16. Planning Your Exhibit - Slideset, University of California.
17. Automation for Profit - Slidefilm with record, Kent Feed Company.
18. Financial Statements; Merchandise Management; Budgeting and Financial Planning; Return on Investment; Grain and Feed History and Terminology; and Securing Bank Loans - Cassettes; Iowa Grain and Feed Association.
19. Bookkeeping - Individual Study Course, Farmland Industries, Inc.
20. Basic Management - Individual Study Course, Farmland Industries, Inc.
21. Money Management - Teaching unit, Successful Farming Vo-Ag Teaching Service.
22. Purina Business Management Home Training Course on Financial Statements; Measuring Profit; Financial Soundness; and Receivables Turnover Ratios; Ralston Purina Company.
23. Farm Store Merchandising - Periodical, Miller Publishing Company.
24. Agri Business Report - Periodical, Miller Publishing Company.
25. Farm Supplier - Periodical, Watt Publishing Company.

Product Knowledge of Agricultural Supplies

Problem Areas

A. Feed and grain
B. Fertilizer and seeds
C. Chemicals
D. Animal health
E. Hardware, farm equipment and lumber
F. Petroleum and petroleum products

Competencies and Learning Activities

A. Feed and grain

Competencies - students will be able to:

1. Determine the basic economics of livestock feeding including: feed costs versus other production costs; feeding as it affects rate of gain, feed efficiency, and market quality; minimal standards for rate of gain and feed efficiency; economic gains resulting from proper use of rations; computing least cost rations; and determining the most profitable level of production.
2. Describe nutrients required for livestock, purposes for which nutrients are used, nutrients required for various classes of livestock, sources of nutrients, and value and use of food additives.
3. Assess the regulations in the formulating, labeling, and using of feeds. The following areas will be considered: state regulations; federal regulations; label requirements and regulations; open formula feeds; and closed formula feeds.
4. Formulate grain and protein rations.
5. Analyze the methods used in preparing feeds such as grinding, crushing, rolling, cracking, mixing, crumbling, and pelleting.
6. Explain the methods used and the common trends in feed merchandising.
7. Describe the methods used and common practices in the buying, selling, handling and warehousing of feed grains. (See Animal Science and Agricultural Products Processing and Distribution Curriculum Guides.)

Learning activities:

1. Secure some small young animals, such as rabbits or white rats. Place them in individual cages and feed them complete rations. Record the weight and amount of feed eaten daily. Compute the amount of feed required per pound of gain and compare their feed efficiency with meat producing animals.
2. Obtain from a slaughter house the digestive tracts of ruminants, poultry, and swine. Trace the passage of feed through each digestive tract.
3. Students bring grain samples to class to send to a laboratory (generally through a local feed company) for a protein test. Compare the results with those obtained by others in the class for the same kind of material.
4. Take a field trip to an experiment station or farm to observe the experimental work being conducted on livestock nutrition. (See the Animal Science and Agricultural Products. Processing and Distribution Curriculum Guides.)

B. Fertilizer and seeds (See the Agronomic Science Guide)

Competencies - students will be able to:

1. Describe the economic value of the use of fertilizer and commercial seeds in crop production.
2. Review the life processes of plants, considering: photosynthesis; transpiration; respiration; assimilation; growth and reproduction.
3. Explain the classes of essential soil elements, functions of plant food elements, and factors affecting yields other than plant food elements.

4. Explain how fertilization is affected by basic physical, chemical, and biological properties of soils.
5. Describe the characteristics of commonly used fertilizer materials. Consider nitrogen-carrying materials and their uses, phosphorus-carrying materials and their uses, and potassium-carrying materials and their uses.
6. Explain the following in relation to formulating mixed fertilizers: interpretation of fertilizer formulas; percent of contents, reading fertilizer tags; comparing fertilizer analyses; trace elements; pesticide additives; state regulations; selecting analysis and amounts from an economic standpoint; and principle ratios and grades of mixed fertilizers.
7. Illustrate the different methods used to determine the fertility needs of soils and take soil samples correctly.
8. Interpret a soil test report.
9. Make fertilizer recommendations.
10. Distinguish the methods of handling and storing commercial fertilizers.
11. Interpret seed tags and labels.
12. Recognize the advantages and disadvantages of soybean, oats, and forage varieties in Iowa.
13. Determine the criteria used in hybrid seed corn selection.

Learning activities:

1. Students will make a soil monolith of at least one type of soil and label the horizons. Describe the characteristics of each horizon of the monolith.
2. Students obtain weather data for the area showing average rainfall by months, average number of days of sunshine by months, average dates of last killing frost in the spring and first killing frost in the fall. Using this data, prepare a chart showing dates for planting spring crops and dates when the crops should be harvested in the fall. This data may be recorded on a map.
3. Prepare a demonstration which will illustrate the relationship of lime to the availability of the major plant food nutrients in the soil.
4. Prepare a chart for display in a farm supply store to show customers the sources and benefits from fertilizer.
5. Student committees plan and conduct an open house to observe variety and fertility test plots at appropriate times during the year. This program may simulate an open house at a farm supply center, or it might be in an actual business operation.
6. Plant variety and fertility demonstration plots and hold field days as class or FFA activities.

C. Chemicals (See Agronomic Science Guide)

Competencies - students will be able to:

1. Describe the importance of agricultural chemicals.
2. Identify the various types of pests in the area and damage done by each. Groups or major areas are: weeds, insects, diseases, rodents, nuisance birds, and nematodes.
3. Explain the responsibility involved in recommending the correct pesticide use. Areas of study are: determining if chemical control is best treatment, factors to consider in

selecting the best pesticide, major categories or types of pesticides, characteristics and uses of each type, and nonpesticides and their uses.
4. Outline the factors to be considered in recommending correct practices to follow in the application of pesticides, including: basic factors to consider, forms in which pesticides are available, time of application, methods of application, safety factors to consider, and selecting, using, and calibrating equipment.
5. Analyze information on pesticide labels and other literature pertaining to pesticides.
6. Advise customers in the safe handling, storage, and use of agricultural chemicals.

Learning activities:
1. Obtain labels from containers of pesticides and make a list of these materials indicating: trade name; active ingredients; time, rate and method of application; residue tolerance; and safety precautions.
2. Calculate the amount of the packaged material to provide a given amount of active ingredient.
3. From the directions, calculate the amount of packaged material to use per gallon, or per pound, or per acre.
4. Field trip to identify weeds.
5. Prepare a recommended weed control program for a farm.

D. Animal health (See Animal Science Guide)

Competencies - students will be able to:
1. Define animal health terms.
2. Assess the uses, advantages and disadvantages of antibiotics.
3. Determine the medications and other feed additives commonly used, the purposes of each, and the precautions necessary when using them.
4. Distinguish the wormer products available for cattle, hogs, sheep, and horses and the conditions where they are used.
5. Interpret those factors necessary to use common products for the treatment and control of external parasites.
6. Make injections properly.
7. Recognize the federal, state, and county regulations regarding the animal health industry.
8. Describe the symptoms shown by diseased and unhealthy animals.

Learning activities:
1. Prepare a list of animal health products sold in a farm supply or animal health center.
2. Students prepare displays of antibiotics, sulfa-drugs, wormers, biologicals and external parasite controlling animal health products.
3. Students use the list of products from No. 1 and prepare a chart showing the product, disease or condition used for, period used, precautions in using, and approximate cost.
4. Students practice making injections.

E. Hardware, farm equipment, and lumber

(Please refer to the Guide for Agricultural Mechanics for competencies, learning activities, and instructional aids)

F. Petroleum and petroleum products (See Agricultural Mechanics Guide)

Competencies - students will be able to:

1. Describe the importance of petroleum products in agriculture, current usage, future trends, local practices, and terminology used in reference to petroleums, oils, and lubricants.
2. Select tractor and power equipment fuels correctly.
3. Identify the guidelines for proper storage facilities for tractor fuels on the farm.
4. Select proper motor lubricating oils, gear oils, lubricating greases, and hydraulic oils for farm machinery and equipment.
5. Explain the selection, delivery, and storage of heating oils.
6. Describe products usually available to farmers through petroleum salesmen. Examples are: anti-freeze, tires, batteries, sparkplugs, and V-belts.
7. Appraise the safety laws and regulations pertaining to the delivery and storage of liquid petroleum.
8. Demonstrate the requirements for a chauffeur's license and drive a truck carefully and safely.

Learning activities:

1. Students study for and obtain a chauffeur's license.
2. Contruct a display of motor oils, hydraulic oils, and greases.
3. Invite a petroleum specialist to speak to the class concerning petroleum and petroleum products.
4. Demonstrate changing motor oil and/or greasing a farm implement.
5. If possible, take a field trip to a manufacturing plant for products usually available to farmers through petroleum salesmen.

Instructional Aids

1. Oklahoma Vocational Agricultural Education, Basic Core Curriculum I, II, and III; State Department of Vocational and Technical Education.
2. A New Day for Cattle Feeders - Slidefilm, Kent Feeds, Inc.
3. The New Keys to Cattle Profits - Slidefilm and record, Kent Feeds, Inc.
4. Three Million Dollar Jackpot - Slidefilm and record, Kent Feeds, Inc.
5. Grub Control - Slideset, Kent Feeds, Inc.
6. This Little Pig Went to Market - Slidefilm and record, Kent Feeds, Inc.
7. Improved Sow Feeding and Management - Slidefilm and record, Kent Feeds, Inc.
8. The Rumen Story - Soundfilm, Ralston Purina Co.
9. Dairy Slides - Kent Feed Company.

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10. Digestion in Swine; Calibrating Field Sprayer; Calibrating a Granular Applicator; Corn Diseases in Illinois; Identification of Weeds, Parts I and II; and Recognizing Herbicide Injury - Slidefilms; Illinois Vocational Agriculture Service.
11. Hardware Retailing - Individual instruction, University of Missouri.
12. Lumber and Building Industry - Individual instruction, University of Missouri.
13. Service Station Operation - Individual instruction, University of Missouri.
14. Petroleum; Anhydrous Ammonia; Fertilizer; Bulk Blending; Swine Feeding and Management; Corn Production; Feed; Agricultural Chemicals; Tires-Batteries-Accessories; Animal Health; and L.P. Gas - Individual instruction, Farmland Industries, Inc.
15. Product Knowledge - Slidefilm; University of Illinois.
16. Safe Use of Pesticides - Soundfilm, University of Illinois. (See Curriculum Guides for Animal Science, Agronomic Science, Agricultural Mechanics and Agricultural Products Processing, and Distribution.)

Business Law

Problem Areas

A. Importance of business law
B. Contracts
C. Liability
D. Federal, state, and local regulation of agricultural businesses

Competencies and Learning Activities

A. Importance of business law

Competencies - students will be able to:

1. Appraise the responsibilities of employees to help the employing company comply with regulations and avoid acts which would liable and embarrass the firm.
2. Evaluate the legal responsibilities of the firm to employees, customers, business associates, and government.

Learning activities:

1. Invite a lawyer to discuss the importance of business law with the class.
2. List the school rules and regulations and tell how they are enforced.
3. Invite an employer to meet the class, or take a field trip to his place of business.

B. Contracts

Competencies - students will be able to:

1. Interpret definitions of terms used in contracts.
2. Analyze the essentials of a contract which are: an agreement; both offer and acceptance; supported by consideration; have capacity to contract; and have a legal objective.

3. Interpret common contracts used in the farm supply center. Items to be considered are: new facility construction and remodeling; formal and simple contracts; enforcibility - valid, void; compliance - executed or executory; and reciprocate obligations.

Learning activities:
1. Students obtain, bring to class, and explain sample contracts.
2. Two students work together and prepare a contract. Examples they could prepare are agribusiness leases, purchase agreements, and labor contracts.
3. One or more students obtain information and report to the class on collective bargaining.

C. Liability

Competencies - students will be able to:
1. Identify company's liability for customers' property while at the place of business, safety of customers while on the premises, safety of employees, and accidents off the premises.
2. Assess the product liability laws for company liability in the following situation: articles sold to customers, injuries to customers while using articles sold by the firm, and loss of production or sales due to products sold to the customers.

Learning activities:
1. Students discuss situations they have had concerning liability laws.
2. If possible, observe a local court trial where liability is involved.
3. Survey offices of the local courthouse to obtain information concerning liability.

D. Federal, state, and local regulation of agricultural businesses

Competencies - students will be able to:
1. Distinguish the local zoning laws, building codes, fire regulation, and health laws.
2. Describe state agriculture and market laws in the areas of grading, standards, licensing, and labeling, which pertain to the farm supply business.
3. Interpret state labor laws concerning wage and hours; working conditions; unemployment insurance; and disability benefits.
4. Explain the common state health and sanitation, motor vehicle, and conservation laws.
5. Describe those federal laws and regulations important to the agribusiness firm. Categories of laws are: commerce laws and regulations; food and drug laws; and agriculture laws and marketing orders.

Learning activities:
1. Invite a local agribusiness representative to discuss those local, state, and federal laws important to his business.

2. Present court case studies of trials involving local, state, or federal law violations.
3. Role play a trial concerning a violation of a law or laws in this area of study.
4. Students select a law or regulation, research it and report to the instructor and to class members.
5. Field trip to the state legislature.

Instructional Aids

1. Samples of legal instruments, local attorney or printing company representative.
2. Introduction to the Law of Contracts, Addison-Wesley.
3. The Law and You, Ohio Business Association.
4. The Illinois Crop-Share Cash Farm Lease - Slidefilm, University of Illinois.
5. Agricultural Law - programmed instruction series, University of Illinois.
6. Selecting a Lawyer for Your Business, Small Business Association.
7. Basic Management - Individual instruction, Farmland Industries, Incorporated.

EVALUATION

1. Pre-tests should be given to determine the student's competence level at time of entry in as many of the courses as possible. This would permit the exceptional student (especially at the post-secondary level) to test out of the course and identify the student with a low test score who may need individual instruction. There would be some exceptions. For example, all students should make an oral sales presentation.
2. A score sheet may be used to evaluate oral and written presentation. The instructor uses the checklist in evaluating how adequately the student presented the nature of the work, jobs available, advancement opportunities, working conditons, average salary and fringe benefits concerning the job of his choice in the Opportunities in Agricultural Supplies and Services Unit. These score sheets would be used in appropriate forms for other competencies such as sales presentations, informative speeches, and reports on human relations activities.
3. Students may be evaluated on class participation, interest, attendance, and participation.
4. Displays and bulletin board arrangements may be constructed by students and be evaluated.
5. Students may be given a pass-fail type of test on much of the Human Relations Unit. Example: They would meet standards established by the instructor or do further study and repeat the test.
6. Much emphasis in evaluation should be placed on the actual skills and jobs performed by the students. Criteria could include speed, accuracy, neatness, creativity, and approved practices followed when arranging a product display, designing a newspaper ad, or writing a business letter. They could be rated on speed and accuracy and, in some cases neatness when operating adding machines, cash registers, and moisture testers; making out sales tickets; pricing merchandise; and filling out a purchase order.
7. The teacher and employer should evaluate students on their performance during on-the-job training.

8. Written tests would be used to evaluate students' performance in some of the subject matter areas.
9. A team of industry people should be invited to the school to evaluate the students and the program.
10. The final criterion in evaluation should be the job success of the student graduate. This may be done through follow-up surveys of the graduates and their employers.

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Agribusiness and Natural
Resource Education

Curriculum Guide

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SOURCE OF CURRICULUM GUIDES

The following ten curriculum guides in agribusiness and natural resources are available as a set from the Department of Public Instruction:

Agribusiness and Natural Resource Education

Animal Science

Agronomic Science

Agricultural Mechanics

Farm Business Management

Agricultural Supplies and Services

Agricultural Products Processing and Distribution

Horticulture

Agricultural Resources and Conservation

Occupational Experience in Agriculture

Order from Information and Publications Services Section, Department of Public Instruction, Grimes State Office Building, Des Moines, Iowa 50319.

Price, $5.00 per set of ten curriculum guides listed above. Please send remittance with order.

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FOREWORD

This curriculum guide is one of ten developed for use by vocational and technical agribusiness instructors in planning instructional programs to meet the needs of their students. Elementary teachers and instructors in other subject matter areas at the secondary level may find the guide of value in introducing principles of career education in their instructional programs. Although much of the material is designed for use at the secondary or postsecondary levels, many of the competencies may be introduced at the awareness or exploratory levels of career education.

Instructors in multiple-man departments at the secondary level and in postsecondary schools may organize nine-week or semester courses around the units and problem areas outlined in this guide.

Appropriate competencies and learning activities have been provided for each problem area. The competencies listed are those determined in previous studies as needed by persons employed in agricultural products processing and distribution. Instructional aids and references are listed for each unit.

A list of titles of occupations requiring competencies in agricultural products processing and distribution has been included in the guide. It is assumed that only partial attainment of some competencies can be done at the secondary level. The competencies may not be mastered until the student has completed additional preparation at the postsecondary, adult class, or collegiate levels. It is assumed that "hands on" and occupational experience will be provided with class and laboratory instruction at all levels.

Evaluation of the instruction in agricultural products processing and distribution should be based largely upon attainment of the competencies listed in this guide, and on the application of them as students participate in occupational experience programs.

Allocations of units and of instructional time in the four-year sequence of courses at the secondary level are presented in the curriculum guide titled, Agribusiness and Natural Resource Education. Also presented are suggested activities for teachers at the kindergarten through sixth grade level, and suggested outlines of subject matter to be included in exploratory programs at the junior high school level.

Curriculum Guide, Agricultural Products Processing and Distribution was prepared by Wally Koester, Livestock and Marketing, Ellsworth Community College, Iowa Falls, Iowa; and Lewis Lauterbach, Vocational Agriculture Instructor, Osage, Iowa (Committee Chairman).

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This curriculum guide represents the best thinking of a select group of vocational agriculture teachers. It is the result of the pooling of knowledge and experience, and much research of curriculum developments in other states, by 22 men enrolled in Ag Ed 593D, Workshop in Curriculum Development in Agribusiness and Natural Resources during June 1973.

Much credit is due the members of a steering committee which met for three sessions in advance of the workshop to determine the areas to be involved and the format to be followed. The following were members of the steering committee:

State Consultant Staff in Career Education - Emeron Dettmann, Jerry Lamers and Elwood Mabon.

ISU Teacher Education Staff - Dr. Harold Crawford, Dr. Bennie Byler, Richard Carter and Dr. Thomas Hoerner.

Vocational Agriculture Instructors - Garland M. Ashbacher, Tom Hensley, G. Leslie Johnson, Lewis Lauterbach, Dennis Lettow, James L. Patton, Thomas A. Silletto, Frederick A. VanLoh and Joe R. White.

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OCCUPATIONAL TITLES

Instructional programs based upon content in this guide will prepare individuals for job entry, will upgrade occupational skills, or will prepare learner for further occupational preparation.

Meat And Meat By-Products

Brand Inspector
Butcher, All-Round
Commission Man
Department Manager
Livestock Buyer
Livestock Inspector
Locker Plant Operator
Maintenance Man
Market Research Analyst
Meat Grader
Meat Processing Plant Manager
Meat Inspector
Processing Operation Employee
Quality Control Officer
Salesman
Scale Operator
Smoker
Supervisor
Traffic Management Officer
Trucker
Warehouseman
Yard Man

Vegetable And Fruit Processing

Department Manager
Inspector
Maintenance Man
Market Research Analyst
Plant Manager
Processing Operations Employee
Produce Buyer
Produce Grader
Quality Control Officer
Receiver
Salesman
Sampler
Scale Operator
Supervisor
Traffic Management Officer
Trucker
Warehouseman

Wool And Other Fiber Products

Commission Man
Department Manager
Maintenance Man
Market Research Analyst
Mill Manager
Processing Operations Employee
Salesman
Scale Operator
Supervisor
Traffic Management Officer
Trucker
Quality Control Officer
Warehouseman
Wool Blender
Wool Buyer
Wool Grader
Wool Inspector
Wool Sorter

Dairy Processing

Dairy Products Buyer
Dairy Tester
Department Manager
Field Contact Man
Inspector
Maintenance Man
Market Research Analyst
Milk Receiver
Milk Sampler
Plant Manager
Processing Operations Employee
Product Grader
Quality Control Officer
Salesman
Scale Operator
Supervisor
Traffic Management Officer
Trucker
Warehouseman

OCCUPATIONAL TITLES (continued)

Grain And Grain-By Products

Commission Man
Fieldman
Grain Buyer
Grain Grader
Grain Processing Employee
Grain Mixer
Grain Elevator Employee
Inspector
Maintenance Man
Manager Grain Elevator
Market Research Analyst
Mill Operator
Quality Control Officer
Salesman
Scale Operator
Seed Analyst
Supervisor
Traffic Management Officer
Trucker
Warehouseman

Egg Processing

Commission Man
Department Processing Manager
Egg Candler
Egg Grader
Egg Inspector
Maintenance Man
Market Research Analyst
Plant Processing Manager
Poultry And Egg Buyer
Processing Operations Employee
Quality Control Officer
Salesman
Scale Operator
Supervisor
Traffic Management Officer
Trucker
Warehouseman

AGRICULTURAL PRODUCTS PROCESSING AND DISTRIBUTION

GENERAL OBJECTIVES

Students completing instruction in agricultural products processing and distribution, will have strengthened their understanding and interest in the processing and distribution of agricultural products, and developed abilities to (1) analyze personal future employment opportunities; (2) develop knowledge of processing and distribution needed for success in the industry; and (3) to organize and assume responsibilities in processing and distribution of agricultural products.

UNITS

Occupational Opportunities
Dairy Processing
Egg Processing
Grain Processing And Grain By-Products
Meat Processing and Meat By-Products
Wool Processing and Other Fiber Products
Vegetable and Fruit Processing

Occupational Opportunities

Problem Areas

A. Scope and economic importance
B. Employment opportunities
C. Employment requirements and conditions

Competencies and Learning Activities

A. Scope and economic importance

Competencies --students will be able to:

1. Describe the nature and scope of the agricultural products processing and distribution industry.
2. Determine the relationship of the industry to the producer.
3. Determine the relationship of the industry to the consumer.
4. Explain the relationship of the industry to the total economy.
5. Describe the place of the industry in our foreign trade.
6. Outline employment trends and opportunities.

Learning activities:

1. Write a definition of the processing industry.
2. Survey.the extent of the industry locally, nationally, and internationally.
3. Describe the importance of the industry to the local community, the state, and nation.
4. Invite processor to speak to class.

B. Employment opportunities

Competencies - students will be able to:

1. Identify broad occupational areas.

2. Identify jobs available.
3. Compare wage rates with those of other businesses.

Learning activities:

1. Write summary of regional and national job potential.
2. Survey community for number and types of jobs available.
3. Compare employment opportunities with those of other businesses.
4. Report on the long range potential of the industry.

C. Employment requirements and conditions

Competencies - students will be able to:

1. Identify competencies and skills required.
2. Identify educational or training requirements.
3. Describe working conditions encountered.
4. Recognize the physical requirements needed.

Learning activities:

1. Report on field trip taken to observe working conditions and physical requirements of the industry.
2. Resource persons speak to class on educational requirements and competencies needed.
3. Interview one or more persons on educational, physical, and training requirements.
4. Analyze and describe one or more jobs through the use of work sheets.

Instructional Aids:

1. Make slides and transparencies in local area showing the important procedures in your course of study.
2. This is the Dairy Industry, Film - Modern Talking Picture Service.
3. Careers in Food Science and Technology, Film - Institute of Food Technologists.
4. Agribusiness is Everyone's Business - Film - Bureau of Audio-Visual Instruction.
5. Principles of Food Sanitation, (BAVI).
6. This is the Dairy Industry, Film - Michigan State University.
7. Food Processing Industry, Strip Film; The Poultry Industry, Strip Film, Vo-Ed Productions.

Evaluation

1. Pre- and post-test.
2. Physical fitness tests.
3. Interest inventory tests.

References

Bulletins:

1. OPPORTUNITIES IN VOCATIONAL AND TECHNICAL EDUCATION, Wisconsin State Board of Vocational, Technical and Adult Education.
2. SCIENCE AND TECHNOLOGY GUIDE, Coop Extension Service, University of Missouri.

3. AGRICULTURAL STATISTICS, 1972 USDA.
4. CAREERS FOR YOUTH IN THE POULTRY INDUSTRY, Western Poultry Cong.
5. CAREERS IN GRAIN, FEED, AND FARM SUPPLY, Grain and Feed Dealers National Association.
6. THE SCIENCE AND TECHNOLOGY OF FOOD, Inst. of Food Technologists.
7. CHOOSE FROM 20,000,000 JOBS FOR MEN AND WOMEN, Agricultural Inst.
8. DAIRY AND FOOD TECHNOLOGY, Dept. of Dairy and Food Industry, ISU.

Books:

1. ANIMAL SCIENCE -- Ensminger, Interstate Printers & Publishers.
   MODERN MKTG. OF FARM PRODUCTS -- Mortenson, Interstate Printers & Publishers.
   CAREERS IN AGRIBUSINESS AND INDUSTRY -- Stone, Interstate Printers & Publishers.
   AGRICULTURE IN OUR LIVES -- Krebs, Interstate Printers & Publishers.
   HANDBOOK OF AG. OCCUPATIONS -- Hoover, Interstate Printers & Publishers.
   HERE'S HOW--ON THE JOB TRAINING, Interstate Printers & Publishers.
2. POULTRY PRODUCTION -- Card, Lea and Febiger.
3. MODERN DAIRY PRODUCTS -- Lampert, Chemical Publishing Company.
4. CAREER OPPORTUNITIES FOR TECHNICIANS AND SPECIALISTS, J. G. Ferguson Publishing Company.
5. INTRODUCTION TO FOOD SCIENCE & TECHNOLOGY -- Stewart & Amerine Academic Press.

Dairy Processing

Problem Areas

A. Collect milk from producers
B. Receive, clarify, and filter milk
C. Determine milk quality
D. Process milk
E. By-products and special products
F. Maintain sanitary equipment

Competencies and Learning Activities

A. Collect milk from producers

Competencies - students will be able to:
1. Determine collection method and equipment to use.
2. Account for milk to customers.
3. Operate a collection route.

Learning activities:
1. Write a description of two collection methods.
2. Write receipts to customers using work sheets and samples.
3. Demonstrate to supervisor how to operate a collection route.
4. Ride with bulk transport operator.
5. Participate in occupational experience program.

B. Receive, clarify, and filter milk

Competencies - students will be able to:
1. Operate equipment at receiving dock.

2. Determine amount of milk received.
3. Operate filtering and clarifying equipment.
4. Adjust cooling equipment for proper temperature control.

Learning activities:
1. Describe two methods of receiving milk from the producer.
2. Demonstrate weighing of milk.
3. Set up and operate filtering and clarifying equipment for supervisors.
4. Demonstrate adjustments of cooling equipment.
5. Take class field trips to producers' farms and to processors.
6. Students participate in occupational experience programs.

C. Determine milk quality

Competencies - students will be able to:
1. Sample and preserve an amount of milk.
2. Identify off flavors.
3. Run butterfat tests using babcock or other approved test.
4. Run SNF tests.
5. Determine acid content of milk.

Learning activities:
1. Write description of proper sampling technique.
2. Practice identification of flavors with knowns until proficient.
3. Write step by step procedure on each test.
4. Demonstrate each test for supervisor.
5. Take field trip to processor's laboratory.
6. Student serve period as an apprentice.

D. Pasteurization, homogenization, and filling containers

Competencies - students will be able to:
1. Operate pasteurization, homogenization, and filling equipment.

Learning activities:
1. Describe the different methods of pasteurization in general use.
2. Write descriptions and operational techniques of equipment using instruction books and personal observation.
3. Demonstrate operational skills to supervisor.
4. Participate in occupational experience program.

E. By-product and special product manufacture

Competencies - students will be able to:
1. Operate manufacturing equipment for selected product.
2. Adjust equipment to product specifications.
3. Follow established manufacturing, curing, or mixing procedures.
4. Package manufactured product.
5. Store the manufactured product.

Learning activities:
1. Identify and describe specialty products of the dairy processing industry.
2. Describe methods of manufacturing selected specialty products.

3. Demonstrate operation of selected equipment.
4. Describe proper storage methods and facilities.
5. Take field trip to local processor.

F. Maintain sanitary equipment and facilities

Competencies - student will be able to:

1. Select specific sanitizing agent for purpose intended.
2. Determine proper method for sanitizing each type of equipment.
3. Sanitize each piece of equipment by established standards.
4. Prevent rodent and insect infestation.

Learning activities:

1. Describe the sanitizing agents and their specific purpose in a plant cleanliness program.
2. Demonstrate proper techniques in sanitizing plant and equipment.
3. Describe methods of prevention of entry of rodents and insects.
4. Make display of sanitizing materials.

Instructional Aids

1. Course Outline for Milk Processing Plant Employee - Texas A & M University.
2. Cheese and Cheese Making - ISU Media Resources.
3. Small Milk Plant Operation (Cleaning Equipment) - ISU Media Resources.
4. Processor Milk Flavor Chart, Bulletin Mailing Room, University of Wisconsin.
5. Resource Unit - Butter & Cheese Mfg., Department of Public Instruction, University of Wisconsin.

Evaluation

1. Pre- and post-test.
2. Methods of testing to reveal competencies in identifying flavors, product grades, testing materials, equipment and techniques, materials for sanitizing equipment and the proper use to assure a sanitary plant, and rodent control.

References

Bulletins:

1. FLAVOR DEFECTS OF MILK, Pm 800, ISU Bulletin Office.
2. MAKING CHEDDAR CHEESE FROM PASTEURIZED MILK, Bulletin 464.
   STANDARDIZING MILK FOR CHEESE MAKING, Circ. 408, Bulletin Mailing Room, University of Wisconsin.
3. CHEESE BUYING GUIDE FOR CONSUMERS, Mktg. Bulletin 17-106.
   CHEESE VARIETIES, Ag. Handbook No. 54.
   JUDGING AND SCORING MILK, Farmers Bulletin 2111
   KNOW YOUR GRADES OF BUTTER, USDA Bulletin No. 12, Superintendent of Documents.

Books:

1. MANUAL FOR MILK PLANT OPERATORS, Milk Industry Foundation.
2. MILK PRODUCTION AND PROCESSING, Judkins & Kerner — Wiley.

3. MILK PASTEURIZATION, AVI Publishing Company, Westport, Conn.
4. MIDWEST FARM HANDBOOK, ISU Press.
5. DAIRY PRODUCTION, Diggins & Bundy, Prentice Hall, Inc.
6. DAIRY SCIENCE, Ensminger.
   MODERN MKTG. FARM PRODUCTS, Mortenson.
   APPROVED PRACTICES IN DAIRYING, Mortenson & Jurgenson.
   DAIRY CATTLE SCIENCE, Ensminger, Interstate.

Egg Processing

Problem Areas
- A. Assembling of eggs
- B. Grading and pricing of eggs
- C. Packaging eggs
- D. Storing eggs
- E. Transporting eggs
- F. Marketing eggs
- G. Processing eggs

Competencies and Learning Activities

A. Assembling of eggs

Competencies - students will be able to:
1. Describe collection methods.
2. Explain the operation of equipment used in assembling eggs.
3. Account for eggs to customer.
4. Operate collection truck or collection point.

Learning activities:
1. Report on collection methods observed on field trip.
2. Operate collection point or truck under supervision.
3. Participate in occupational experience program.

B. Grading and pricing eggs

Competencies - students will be able to:
1. Describe the structure of an egg.
2. Evaluate external indicators of egg quality.
3. Evaluate internal quality of eggs.
4. Candle eggs.
5. Determine grades of eggs.
6. Calculate value of eggs.

Learning activities:
1. Explain egg structure, external and internal quality factors, through the use of work sheets.
2. Use slides and film strips on egg quality and grading.
3. Demonstrate methods of candling and grading from observation and field trips.
4. Demonstrate candling, weighing, and grading of eggs.
5. Calculate value of a consignment of eggs by use of a work sheet showing grades, weight, discounts and price.
6. Student serve as an apprentice.
7. Participate in occupational experience program.

C. Packaging eggs

Competencies - students will be able to:
1. Select packaging materials.
2. Assemble packaging materials.
3. Package eggs for storage and shipping.

Learning activities:
1. Describe different packaging materials and methods observed from field trip.
2. Package eggs for supervisor.
3. Take field trip to egg producer and to egg processor.

D. Storing eggs

Competencies - students will be able to:
1. Determine proper storage temperature.
2. Adjust and operate cooling and humidity control equipment.
3. Properly place eggs in storage.

Learning activities:
1. Describe storage facilities observed on field trip.
2. Explain operation of temperature controls.
3. Stack cases in storage to allow proper cooling and air movement, for supervisor.

E. Transporting eggs

Competencies - students will be able to:
1. Select most economical and efficient shipping method.
2. Prepare bill of lading.
3. Inspect car or truck to determine if acceptable.
4. Determine proper temperature settings.
5. Adjust temperature controls.
6. Load car or truck.

Learning activities:
1. Calculate most efficient and economical shipping method, using rate and schedule books with work sheets.
2. Prepare bill of lading using work sheets and sets of instructions.
3. Describe temperature control equipment.
4. Prepare truck for loading, set temperature controls, and load on field trip for supervisor.

F. Sales of eggs

Competencies - students will be able to:
1. Receive and follow daily markets.
2. Analyze through use of committees, potential markets and describe special characteristics of each.
3. Contact customers and make sales (see Salesmanship Unit in Agricultural Supplies and Service Guide).

Learning activities:
1. Keep in touch with markets and market conditions through radio, newspapers, and government reports.

2. Chart market prices of eggs daily for 60 days.
3. Survey community for potential markets.
4. Investigate potential in distant markets.
5. Practice making sales to other students in class.

G. Egg processing

Competencies - students will be able to:

1. Operate the processing equipment.
2. Adjust equipment for most efficient processing.
3. Maintain equipment for safe and healthful operation.
4. Select and clean equipment with proper sanitizing materials.
5. Select packaging materials for product being processed.
6. Package processed product.
7. Determine proper temperature for product storage.
8. Store the processed product.

Learning activities:

1. List each piece of processing equipment and describe the operation of each though the use of work sheets.
2. Adjust equipment under supervision on field trip.
3. Describe cleansers and sanitizers, and cleaning methods necessary for use to maintain a healthful, contamination free operation.
4. Explain proper packaging and storing procedures for product.
5. Student serve period as an apprentice.
6. Student participate in occupational experience program.

Instructional Aids

1. How to Buy Eggs - Slideset, ISU Film Library.
2. Grading Eggs for Quality - Filmstrip, Vo-Ed Products.
3. Judge and Grade Poultry and Eggs - Filmstrip, Vo-Ag Services.
4. U.S. Standards for Quality of Individual Shell Eggs (chart)
   Interior Quality of Eggs (colored, example leaflet)
   Know the Eggs You Buy (actual size chart of broken out eggs), USDA Consumer Marketing Service.

Evaluation

1. Pre- and post-test.
2. Egg grading, packaging, and storing competencies.

References

Bulletins:

1. DETERMINING EGG QUALITY, Bul. 341, Ohio University Agriculture Extension Service.
2. NEEDED - CLEAN SOUND EGGS, Pm 1206, ISU Bulletin Office.
3. THE EGG PRODUCTS INDUSTRY-STRUCTURE, PRACTICES, COSTS, MRR 917,
   IMPROVED METHODS, TECHNIQUES, AND EQUIPMENT FOR CLEANING EGGS, MRR 757.
   EGG GRADING MANUAL, Ag. Handbook No. 75.
   SHELL EGG GRADING AND INSPECTION OF EGG PRODUCTS, Mktg. Bul. 30, USDA Consumer Marketing Service.

4. EGG PRODUCTS, Issued Monthly
   EGGS, CHICKENS, AND TURKEYS, Issued Monthly, USDA Statistical Reporting Service

Books:

1. POULTRY PRODUCTION, Bundy and Diggins, Prentice Hall.
2. POULTRY PRODUCTION, Card, Lea and Febiger
3. POULTRY SCIENCE AND PRACTICE, Winter & Funk, Lippincott.
4. ANIMAL SCIENCE, Ensminger
   MODERN MARKETING OF FARM PRODUCTS, Mortenson.
   FARM POULTRY PRODUCTION, Wilson and Card.
   APPROVED PRACTICES IN POULTRY PRODUCTION, Biddle and Juergson, Interstate Printers and Publishers.
5. MIDWEST FARM HANDBOOK, ISU Press.
6. EGG SCIENCE AND TECHNOLOGY, AVI.

Grain Processing and Grain By-Products

Problem Areas

A. Purchasing of grain
B. Condition and store grain
C. Warehousing of grain
D. Transportation of grain
E. Processing of grains into human and animal foods
F. Filling orders for processed products

Competencies and Learning Activities

A. Purchasing of grain

Competencies - students will be able to:

1. Operate weighing scales and prepare weighing ticket.
2. Take composite sample of grain.
3. Determine moisture content of grain, dockage, damage, etc.
4. Grade grain.
5. Determine price per unit and total for lot.
6. Follow markets and chart prices.

Learning activities:

1. Explain scale operational procedures and scale ticket use.
2. Demonstration operation of a moisture tester.
3. Describe taking a composite grain sample.
4. Calculate grade, discounts, and price from reference and work sheets.
5. Observe weighing and purchasing procedures on field trip.
6. Student serve period as an apprentice.
7. Participate in occupational experience program.

B. Condition and store grain

Competencies - students will be able to:

1. Maintain clean and orderly conditioning and storage units.
2. Operate grain transfer and elevating equipment.
3. Clean and dry grain.

4. Receive and bin grain.
5. Keep inventory of binned grain.
6. Check and record temperatures of grain in storage.
7. Operate aeration and conditioning equipment.
8. Control birds, rodents, and insects in stored grain.

Learning activities:

1. Observe necessity for safety and cleanliness in operation, and observe machinery in operation.
2. Determine receiving, binning, and inventorying techniques from the use of work sheets.
3. Explain setting and operation of machinery from instruction books, and work sheets.
4. Describe purpose and operational techniques of aeration and conditioning equipment.
5. Describe approved methods of control of insects, rodents and birds.
6. Student serve period as an apprentice.

C. Warehousing of grain

Competencies - student will be able to:

1. Interpret government regulations of warehousing.
2. Use hedging techniques to protect business profits. (see Farm Business Management Guide on hedging)

Learning activities:

1. Solve individual and class problems on regulatory and warehousing problems.
2. Calculate advantages of hedging using examples from local elevator or class problems.
3. Visit a broker's office.
4. Visit a commodity market.

D. Transportation of grain

Competencies - student will be able to:

1. Interpret freight rates.
2. Fill out shipping forms.
3. Select best shipping method.
4. Prepare and load rail cars and trucks.

Learning activities:

1. Use rate books in solving shipping cost problems.
2. Calculate shipping costs using work sheets.
3. Prepare and load cars on field trip for supervisor.
4. Serve as apprentice at grain terminal.

E. Processing of grain into human and animal foods

Competencies - students will be able to:

1. Identify and explain the purpose of grain processing machines.
2. Determine the necessary processes for a particular product.
3. Operate grain processing equipment.
4. Package and store the finished product.

Learning activities:

1. Determine proper machine operational techniques from study of operating manuals, demonstrations and work sheets.
2. Explain settings and adjustments to achieve required quality product.
3. Demonstrate machine operation for supervisor.
4. Participate in occupational experience program.

F. Filling orders

Competencies - students will be able to:

1. Blend grain.
2. Maintain an inventory of grain and products.
3. Fill and invoice orders.

Learning activities:

1. Learn inventorying techniques from study of references and work sheets.
2. Fill out problem orders using order forms, invoices and prices.
3. Determine blending techniques from field trip observation.
4. Demonstrate blending techniques for supervisor.
5. Student serve period as an apprentice.

Instructional Aids

1. Grain Futures, Transparencies.
   Storing and Drying Corn, Programmed Materials.
   Grain Marketing, Materials Packet and Source Unit.
   Marketing Ag. Products, Instructor guide and student manual, University of Illinois, Vo-Ag Service.
2. Marketing Grain Through a Grain Exchange, Slides, ISU Film Library.
3. Samples of Grain for Grading, Mr. Belmer Ekis, USDA.

Evaluation

1. Pre- and post-test.
2. Demonstrate grain grading competence.
3. Display competence in calculating transportation costs, storing advantages, and hedging advantages.

References

Bulletins:

1. BIN DRYING SHELLED CORN, Pm 313.
   CORN STORAGE, How and Where, Pm 319.
   BATCH AND CONTINUOUS DRYERS FOR CORN, Pm 382.
   AERATION OF STORED GRAIN, Pm 407, Iowa State University Bulletin Office.
2. DRYING CORN AT THE COUNTRY ELEVATOR, Circ. 1053, University of Illinois Extension Service.
3. IOWA BONDED WAREHOUSE LAW, Chapter 543, Code of Iowa.
   TARIFF SHEETS
   SAMPLE CONTRACTS
   WAREHOUSE RECEIPT RELEASES
   APPLICATION FOR WAREHOUSE LISCENSE
   TARIFFS FOR WAREHOUSING, Iowa State Commerce Commission

4. GENERAL CROP PRODUCTION REPORTS, 16 Issues Yearly.
   STOCKS OF GRAINS, Issued Quarterly.
   SOYBEAN STOCKS, Issued in September, Statistical Reporting Service, USDA.

Books:

1. OFFICIAL GRAIN STANDARDS OF THE U.S., USDA Marketing Service.
2. MIDWEST FARM HANDBOOK, ISU Press
3. MODERN MARKETING OF FARM PRODUCTS, Mortenson, Interstate
4. INTRODUCTION TO GRAIN MARKETING, Wills, Interstate.
5. 1969 YEARBOOK OF AGRICULTURE, USDA.
6. GRAIN STORAGE--PART OF A PROBLEM, Sinha & Muir, AVI Publishers.
7. U.S. GRAIN STANDARDS ACT
   SAMPLING DEVICES (MECHANICAL)
   GRAIN INSPECTION MANUAL, Mr. Belmer Ekis.

Meat Processing and Meat By-products

Problem Areas

A. Assembly of livestock
B. Buying of livestock
C. Transporting to plants
D. Slaughtering (commercial and home)
E. Breaking and fabrication
F. Storage
G. Packaging
H. By-products
I. Sales of all products
J. Transportation from wholesaler to retailer

Competencies and Learning Activities

A. Assembly of livestock

Competencies - students will be able to:
1. Explain types of markets and/or collection points.
2. Analyze advantages and disadvantages of various markets and/or collection points.

Learning activities:
1. Describe a market and its functions in detail from reference material and field trip to markets.
2. Interview representative of a market and report to class.
3. Serve as apprentice.

B. Buying of livestock

Competencies - students will be able to:
1. Recognize livestock that will provide profitable carcasses.
2. Explain the factors related to buying and pricing of livestock.
3. Figure pencil shrink.
4. Operate scales.
5. Operate calculator.

6. Estimate weight, grade, and factors affecting shrinkage.
7. Sort by weight and grade.
8. Converse and work with people.

Learning activities:

1. Evaluate and grade livestock, carcasses and wholesale and retail cuts at packing plant or locker.
2. Use work sheets on pricing problems using reference material.
3. Interview buyer and report to class.
4. Operate equipment under supervision of head buyer.
5. Buy livestock under supervision of heat buyer.
6. Ride with country buyer.

C. Transportation to plants

Competencies - students will be able to:

1. Explain advantages and disadvantages of different types of freight.
2. Prepare livestock and equipment for transporting.

Learning activities:

1. Interview livestock transportation personnel and report to class.
2. Prepare a truck for shipment of livestock under supervision.
3. Load livestock and drive them to destination.

D. Slaughtering (commercial and home)

Competencies - students will be able to:

1. Explain killing room procedure.
2. Use and care for slaughtering equipment.
3. Explain the necessity for cleanliness and plant inspection.
4. Describe methods of slaughtering one species of livestock or poultry in detail.
5. Recognize and describe the functions of the slaughtering process.
6. Identify products and by-products of the slaughtering process.

Learning activities:

1. Describe slaughtering process of one species after field trip to packing plant and/or locker plant for observation of slaughtering process and equipment needed.
2. Report on inspection of plants and products from use of reference material.
3. Slaughter an animal under competent supervision.
4. Prepare demonstration of slaughtering for class.

E. Breaking and fabrication

Competencies - students will be able to:

1. Explain cutting room procedure.
2. Use and care for breaking and fabrication equipment.
3. Describe proper procedure in breaking of carcass into wholesale and retail cuts.
4. Explain curing and smoking procedures.
5. Identify uses and explain by-product processing.
6. Cut carcass into retail cuts.

Learning activities:
1. Describe breaking and fabrication of each species after field trip to packing plant and/or locker plant.
2. Report on types of breaking and fabrication from reference material.
3. Break and fabricate meat and poultry under competent supervision.
4. Serve as apprentice.

F. Storage

Competencies - students will be able to:
1. Explain various methods of storage.
2. Use and care for storage equipment.

Learning activities:
1. Describe storage facilities and methods after field trip to packing plant and/or locker.
2. Report on storage relating to economy, and methods and types of storage.
3. Participate as a trainee in storage division.

G. Packaging

Competencies - students will be able to:
1. Wrap and label meat properly.
2. Analyze and describe different methods of packaging.

Learning activities:
1. Wrap and label meat under competent supervision.
2. Describe the different methods of packaging after field trip to packing plant and/or locker.
3. Conduct packaging contest.

H. By-products

Competencies - students will be able to:
1. Identify and analyze by-products for their importance to society and to the economy.
2. Discuss the processing and use of by-products.

Learning activities:
1. Prepare reports or work sheets on uses of by-products from reference material.
2. Field trip to by-product processing plant to observe and to report on processing of different by-products.

I. Sales of all products

Competencies - students will be able to:
1. Demonstrate skills necessary for sales (refer to Agricultural Supplies and Services Guide).
2. Describe and analyze markets available for these products.
3. Be aware of products and their uses (refer to section D, E, F, G, and H).

Learning activities:

1. Survey markets available for meat and meat by-products.
2. Conduct a market survey of customer's wants and needs.
3. Students give examples of good and poor sales techniques from observing the meat sales force and by-product sales force performing their duties.
4. Combine salesmanship and product knowledge in selling of meat and meat by-products under competent supervision.

J. Transportation from wholesaler to retailer

Competencies - students will be able to:

1. Determine most economical and efficient means of transportation.
2. Recognize the problems associated with transporting perishable goods.

Learning activities:

1. Use schedule and rate sheets to determine most economical and efficient means of transportation.
2. Make a survey on the methods of transportation and the problems involved with perishable goods.

Instructional Aids

1. A Representative Beef Carcass Breakdown, Film, ISU Media Resource Center.
2. A Representative Hog Carcass Breakdown, Film, ISU Media Resource.
3. A Representative Beef Rib Breakdown, Film, ISU Media Resource.
4. A Representative Beef Round Breakdown, Film, ISU Media Resource.
5. A Representative Beef Sirloin Breakdown, Film, ISU Media Resource.
6. A Representative Beef Short Loin Breakdown, Film, ISU Media Resource.
7. A Representative Beef Shank, Brisket, Short Plate and Flank Breakdown, Film, ISU Media Resource.
8. A Mark of Wholesome Meat, Film, ISU Media Resource.
9. A Mark of Quality, Film, ISU Media Resources.
10. Dynamics of Animal Agriculture, Film, ISU Media Resource.
11. Meat on the Move, Film, ISU Media Resource.
12. Marketing Farm Products Abroad, Film, ISU Media Resource.
13. Sheep Meet the Challenge, Film, ISU Media Resource.
14. Handling Hogs Safely, Slide Set, ISU Media Resource.
15. Beef Conformation, Slide Set, ISU Media Resource.
16. Swine Conformation, Slide Set, ISU Media Resource.
17. Sheep Conformation, Slide Set, ISU Media Resource.
18. Meat Identification, Slide Set, ISU Media Resource.
19. Meat Identification, Slide Set, ISU Media Resource.
20. Sausage-Our Heritage From the Past, Slide Set, ISU Media Resource.
21. Preventing Transportation Losses of Livestock, Filmstrip No. 02237P-186A, Nasco.
22. The Proper Way to Home Cure Meat, Filmstrip No. 0157P-N79, Nasco.
23. Slaughtering and Cutting Hogs, Filmstrip No. 0376P-273, Nasco.
24. Freezing and Storing Beef For Home Use, Filmstrip No. 0392P-193, Nasco.
25. Beef Chart (Retail Cuts of Beef), National Livestock and Meat Board.
26. Lamb Chart (Retail Cuts of Lamb), National Livestock and Meat Board.

27. Pork Chart (Retail Cuts of Pork), National Livestock and Meat Board.
28. Of Time and Salesman, Film, Movies USA, Inc.
29. Salesmanship in Agricultural Business, Slidefilm, Illinois Vocational Agriculture Service.

Evaluation

1. Pre- and post-test.
2. Meat identification scores.
3. Beef, pork and lamb grading scores.
4. Meat cutting competence.
5. Live animal evaluation and selection scores.
6. Transportation problems and work sheets.
7. Packaging competence.
8. Plant and meat inspection competencies.
9. On-the-job experience competencies.

References

Bulletins:

1. USDA YIELD GRADES FOR BEEF, No. MB45, 1968, USDA.
2. SLAUGHTERING, CUTTING AND PROCESSING PORK, No. 2138, USDA.
3. SLAUGHTERING, CUTTING AND PROCESSING LAMB AND MUTTON, No. 2152, USDA.
4. GRADES FOR SLAUGHTERING SWINE AND FEEDER PIGS, No. 51, 1970, USDA.
5. GRADES FOR PORK CARCASSES, No. 49, 1970, USDA.
6. USDA YIELD GRADES FOR LAMBS, No. 52, 1970, USDA.
7. 101 CUTS OF MEAT, National Livestock and Meat Board.

Books:

1. THE MEAT HANDBOOK, Levie, 1963; AVI.
2. THE MEAT WE EAT, Ziegler, 1966; Interstate.
3. MEAT EVALUATION HANDBOOK, National Livestock and Meat Board.
4. ANIMAL SCIENCE AND INDUSTRY, Acker, 2nd Ed.; Prentice-Hall, Inc.
5. THE MARKETING OF LIVESTOCK AND MEAT, FOWLER, 2nd Ed.; Interstate.

Wool Processing and Other Fiber Products

Problem Areas
- A. The fiber industry
- B. Purchasing raw materials
- C. Storage
- D. Transportation of raw materials
- E. Processing of raw materials
- F. By-products
- G. Sales of products
- H. Transportation of processed goods

Competencies and Learning Activities

A. The fiber industry

Competencies - students will be able to:

1. Describe uses of natural and synthetic fibers.
2. Explain the relationship of the fiber industry to the economy.
3. Outline employment opportunities in fiber industry.

Learning activities:

1. Prepare a display using natural and synthetic fibers showing their uses.
2. Interview a clothing store manager and prepare a report on the influence of the fiber industry on the economy.

B. Purchasing of raw materials

Competencies - students will be able to:

1. Operate scales.
2. Determine price using yield, quality and grade.
3. Analyze advantages and disadvantages of various markets and/or collection points.
4. Write out sales ticket or receipt.
5. Operate loading and unloading equipment.

Learning activities:

1. Evaluate and grade wool samples.
2. Determine price of raw material on grade, quality, yield and market demand using work sheets.
3. Interview wool buyer and report to class.
4. Purchase raw materials under supervision.
5. Operate equipment under supervision.

C. Storage

Competencies - students will be able to:

1. Describe packaging of raw materials for storage.
2. Operate storage equipment.
3. Analyze and determine proper storage methods.

Learning activities:

1. Describe different methods of packaging and storage after field trip to wool market and warehouse.
2. Operate storage equipment under proper supervision.
3. Serve as student learner.

D. Transportation of raw materials

Competencies - students will be able to:

1. Explain advantages and disadvantages of different types of freight.
2. Prepare raw wool for shipment.

Learning activities:

1. Make a survey of types of transportation.

2. Determine most economical and efficient method of transportation from freight rates and schedules.
3. Load materials under supervision.

E. Processing raw materials

Competencies - students will be able to:
1. Describe procedure of wool processing in detail from the raw product to fabric and other goods.
2. Explain the processing of other fiber products such as pulpwood.
3. Operate and care for equipment used in processing.
4. Explain the functions of various steps in processing.
5. Identify products and by-products of processing procedure.

Learning activities:
1. Describe processing procedure after visiting woolen mill or other processing center.
2. Collect and label samples from the different steps in processing.
3. Process wool under competent supervision.

F. By-products

Competencies - students will be able to:
1. Identify and analyze by-products for their importance to society and to the economy.
2. Describe the processing and use of by-products.

Learning activities:
1. Prepare reports or work sheets on uses of by-products from reference materials and field trips.
2. Prepare report on processing of the by-products.
3. Visit Amana or other woolen mills.
4. Tour pulp wood factory.

G. Sales of products

Competencies - students will be able to:
1. Demonstrate skills necessary for sales (see Agricultural Supplies and Services Guide).
2. Describe and analyze markets available for these products.
3. Describe features and limitations of products and their uses (refer to Sections A, B, C, D, E, and F).

Learning activities:
1. Survey markets available for fiber and fiber by-products.
2. Conduct a market survey of customer wants and needs.
3. Students give examples of good and poor sales techniques from observing the fiber and fiber by-products sales forces in the performance of their duties.
4. Combine salesmanship and product knowledge in selling of fiber and fiber by-products under competent supervision.

H. Transportation of processed goods

Competencies - students will be able to:
1. Determine most economical and efficient means of transportation.

2. Describe the problems associated with transporting semi-processed or processed goods.

Learning activities:

1. Complete work sheets from freight rates and schedules to determine most feasible way of transporting semi-processed or processed goods.
2. Make a survey on the methods of transportation and the problems involved.

Instructional Aids

1. Sheep Meet The Challenge, Film, ISU Media Resource Center.
2. Fiber to Finished Fabric, Film, ISU Media Resource Center.
3. From Trees to Paper, Film, ISU Media Resource Center.
4. Transportation in the Modern World, Film, ISU Media Resource.
5. Wool Grading Card-Chart, North Central Wool Marketing Corporation.
6. Official Standards of the United States For Grades of Wool, Set of Grades, USDA Consumer and Marketing Service.

Evaluation

1. Pre- and post-test.
2. Wool grading scores.
3. Wool evaluation scores
4. Wool handling competencies.
5. Wool packaging competencies
6. Fiber identification.
7. On-the-job experience competencies.

References

Bulletins:

1. INDUSTRYWIDE PROGRAM TO IMPROVE THE PREPARATION OF THE DOMESTIC WOOL CLIP, Industrywide Lamb and Wool Planning Committee.
2. OFFICIAL STANDARDS OF THE UNITED STATES FOR GRADES OF WOOL, 1966, USDA.
3. WOOL FROM FLEECE TO FABRIC, Wool Education Center, American Wool Council.
4. GLOSSARY OF WOOL FABRIC TERMS, Wool Education Center, American Wool Council.
5. GLOSSARY OF WOOL TERMS, No. 1, American Sheep Producers Council.
6. WOOL-GRADES AND SHEEP THAT PRODUCE THEM, No. 4, American Sheep Producers Council.
7. WOOL-FROM FLEECE TO FABRIC, No. 5, American Sheep Producers Council.
8. GLOSSARY OF WOOL FABRIC TERMS, No. 6, American Sheep Producers Council.
9. CHARACTERISTICS OF WOOLEN AND WORSTED FABRICS, No. 7, American Sheep Producers Council.
10. THE AMERICAN SHEEP PRODUCERS COUNCIL, No. 8, American Sheep Producers Council.
11. SHEEP PRODUCTION IN THE UNITED STATES, No. 9, American Sheep Producers Council.
12. THE STORY OF WOOL, American Wool Council.

Books:

1. ANIMAL SCIENCE AND INDUSTRY, Acker, 2nd Ed.; Prentice-Hall, Inc.
2. SHEEP SCIENCE, Kammalade and Kammalade, Revised Edition, Lippincott.
3. SHEEP AND WOOL SCIENCE, Ensminger, Interstate.

Vegetable and Fruit Processing

Problem Areas
- A. Assembly and receiving the raw products
- B. Processing of the raw products
- C. Storage and warehousing of the processed products
- D. Maintain sanitary equipment and facilities
- E. Transportation of the processed product

Competencies and Learning Activities

A. Assembly and receiving the raw products

Competencies - students will be able to:
1. Receive raw materials at the unloading dock.
2. Determine grade of product.
3. Account for incoming product to customers.
4. Determine quantity of product received.

Learning activities:
1. Field trip to observe plant delivery and unloading methods.
2. Describe receiving and unloading procedures.
3. Define methods of quality and grade determination.
4. Explain how the quantity of product is determined.
5. Participate in occupational experience program.

B. Processing of the raw product

Competencies - students will be able to:
1. Wash and clean the product.
2. Blanch products when necessary.
3. Inspect products in raw state and when processed.
4. Fill containers.
5. Seal containers.
6. Heat process, freeze, or cool products as required.
7. Adjust equipment and freezing ranges.
8. Label containers.

Learning activities:
1. Describe selected operations from observation on field trips.
2. Explain operational machine settings and procedures for selected machines from instruction books, personal instruction, and work sheets.
3. Operate processing equipment for supervisor
4. Serve as student learner or apprentice.

C. Storage and warehousing

Competencies - students will be able to:

1. Receive and store processed products.
2. Keep inventory records of stored products.
3. Determine proper storage temperatures.
4. Adjust and operate freezing, cooling and humidity controls.

Learning activities:

1. Determine inventorying and storage techniques from use of work sheets.
2. Inventory a stock of stored products.
3. Place a stock of products in warehouse.
4. Demonstrate adjustments on freezing, cooling, and humidity control equipment for supervisor.

D. Maintain sanitary equipment and facilities

Competencies - students will be able to:

1. Select sanitizing agents and detergents for specific purpose.
2. Determine correct method of sanitizing each type of equipment.
3. Sanitize each piece of equipment and the facility.
4. Prevent rodent, bird, and insect infestation throughout the plant.

Learning activities:

1. Explain the sanitation laws concerning processing and name the agencies enforcing the laws.
2. Describe sanitizing and cleaning agents, and their uses in a plant cleanliness program.
3. Demonstrate proper plant sanitizing techniques for supervisor.
4. Describe methods of preventing the entry, and the control of rodents, birds, and insects.

E. Transportation of the processed product

Competencies - students will be able to:

1. Interpret shipping rates.
2. Fill out shipping forms.
3. Select best shipping method.
4. Adjust cooling or freezing equipment to proper settings when necessary.
5. Prepare and load rail cars and trucks.

Learning activities:

1. Use rate books and time schedules in solving shipping problems.
2. Calculate shipping costs using work sheets.
3. Prepare and load cars and trucks.

Instructional Aids

1. Maintenance Mechanics Apprenticeship Course Outline Notebook.
   Food Processing Technology Monograph.
   Laboratory Manual for Vegetable Processing Instruction, Moraine Park Technical Institute.
2. The Canning Industry--Vegetable Processing, Wisconsin Department of Public Instruction.

3. A Complete Course in Canning, Lopez, A., The Canning Trade.
4. Fruit and Vegetable Processing Jobs, Wisconsin State Employment Service.
5. Food Cannery, Movie, Audio Visual Education Center, University of Michigan.
6. Freezing Fruits and Vegetables, Movie
   Principles of Food Sanitation, Movie
   Why Foods Spoil, Movie
   The Rat Problem, Movie, BAVI.

Evaluation

1. Pre- and post- test.
2. Demonstrate skills and competencies to instructor or supervisor.

References

Books:

1. FOOD SCIENCE, Potter, AVI Publishing.
2. FUNDAMENTALS OF FOOD PROCESSING OPERATIONS, Heid and Joslyn, AVI Publishing.
3. TECHNOLOGY OF FOOD PRESERVATION, Derosier, AVI Publishing.
4. INTRODUCTION TO FOOD SCIENCE AND TECHNOLGOY, Stewart and Amerine Academic Press.

SOURCES OF REFERENCES AND INSTRUCTIONAL AIDS

1. Agricultural Institute
   Patterson Hall
   North Carolina State University
   Raleigh, North Carolina 27607

2. American Can Company
   7230 Park Avenue
   New York, New York 10017

3. AVI Publishing Company, Inc.
   P. O. Box 831
   Westport, Connecticut 06880

4. Academic Press, Inc.
   111 Fifth Avenue
   New York, New York 10003

5. American Sheep Producers Council
   200 Clayton Street
   Denver, Colorado,80206

6. American Meat Institute
   59 E. Van Buren Street
   Chicago, Illinois 60605

7. American Wool Council
   200 Clayton Street
   Denver, Colorado 80206

8. Mr. Belmer Ekis, Office Supervisor
   USDA Consumer & Marketing Service
   Room 606
   1912 Grand Avenue
   Des Moines, Iowa 50309

9. The Canning Trade
   2619 Maryland Avenue
   Baltimore, Maryland 21218

10. Chemical Publishing Company
    New York, New York 10000

11. J. G. Ferguson Publishing Company
    6 North Michigan Avenue
    Chicago, Illinois 60602

12. Grain and Feed Dealers National Ass'n.
    500 Folger Building
    725 15th Street, N.W.
    Washington, D.C. 20005

13. Industrywide Lamb & Wool Planning Comm.
    600 Crandall Building
    Salt Lake City, Utah 84101

14. Interstate Printers and Publishers
1927 N. Jackson Street
Danville, Illinois 61832

15. Institute of Food Technologists
176 West Adams Street
Chicago, Illinois 60603

16. Iowa State Commerce Commission
Warehouse Division
Des Moines, Iowa 50309

17. Iowa State University

Dept. of Dairy & Food Industry
Dairy Industry Building

Media Resources Center
Pearson Hall

ISU Press
Press Building

Ames, Iowa 50010

18. John Wiley and Sons
605 Third Avenue
New York, New York 10016

19. Lea and Febiger
600 Washington Square
Philadelphia, Pennsylvania 19106

20. J. B. Lippincott Company
E. Washington Square
Philadelphia, Pennsylvania 19105

21. Michigan State University
Extension Service
East Lansing, Michigan 48823

22. Milk Industry Foundation
910 17th Street, N.W.
Washington, D.C. 20006

23. Modern Talking Picture Service
Cedar Rapids, Iowa 52406

24. Moraine Park Technical Institute
Beaver Dam, Wisconsin 53916

25. Moraine Park Technical Institute
Fon du Lac, Wisconsin 54935

26. Movies, USA, Incorporated
729 Seventh Avenue
New York, New York 10000

27. NASCO
Fort Atkinson, Wisconsin 53538

28. National Livestock & Meat Board
26 South Wabash Avenue
Chicago, Illinois 60604

29. North Central Wool Marketing Corp.
101 27th Avenue S.E.
Minneapolis, Minnesota 55414

30. Ohio State University
Agricultural Extension Service
Columbus, Ohio 43210

31. Prentice Hall, Inc.
Englewood Cliffs, New Jersey 07632

32. Superintendent of Documents
Government Printing Office
Washington, D.C. 20402

33. Teaching Materials Center
Texas A & M University
College Station, Texas 77843

34. University of Illinois

Vo-Ag Service

Cooperative Extension Service

Urbana, Illinois 61801

35. University of Michigan
Audio Visual Education Center
Ann Arbor, Michigan 48103

36. University of Missouri
Cooperative Extension Service
Columbia, Missouri 62501

37. University of Wisconsin

Bureau of Audio-Visual Instruction

Bulletin Mailing Room, College of Agri.

Madison, Wisconsin 53702

38. United States Department of Agriculture

Consumers Mktg., Service, Poultry Div.

Statistical Reporting Service

Marketing Service

Washington, D.C. 20250

39. Vocational Education Productions
California Polytech. State University
San Luis Obispo, California 93401

40. Western Poultry Congress
P.O. Box 307
Baldwin Park, California 91706

41. Wisconsin Department of Public Instr.
Madison, Wisconsin 53700

42. Wisconsin State Employment Service
Madison, Wisconsin 53700

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Agribusiness and Natural
Resource Education

Curriculum Guide

HORTICULTURE

A joint publication of:

IOWA STATE UNIVERSITY
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Ames, Iowa 50010

and

DEPARTMENT OF PUBLIC INSTRUCTION
Career Education Division
Grimes State Office Building
Des Moines, Iowa 50319

1973

State of Iowa
DEPARTMENT OF PUBLIC INSTRUCTION
Grimes State Office Building
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SOURCE OF CURRICULUM GUIDES

The following ten curriculum guides in agribusiness and natural resources are available as a set from the Department of Public Instruction:

Agribusiness and Natural Resource Education

Animal Science

Agronomic Science

Agricultural Mechanics

Farm Business Management

Agricultural Supplies and Services

Agricultural Products Processing and Distribution

Horticulture

Agricultural Resources and Conservation

Occupational Experience in Agriculture

Order from Information and Publications Services Section, Department of Public Instruction, Grimes State Office Building, Des Moines, Iowa 50319.

Price, $5.00 per set of ten curriculum guides listed above. Please send remittance with order.

FOREWORD

This curriculum guide is one of ten developed for use by vocational and technical agribusiness instructors in planning instructional programs to meet the needs of their students. Elementary teachers and instructors in other subject matter areas at the secondary level may find the guide of value in introducing the principles of career education in their instructional programs. Although much of the material is designed for use at the secondary or post-secondary levels, many of the competencies may be introduced at the awareness or exploratory levels of career education.

Instructors in multiple-man departments at the secondary level and in post-secondary schools may organize nine-week or semester courses around the units and problem areas outlined in this guide.

Appropriate competencies and learning activities have been provided for each problem area. The competencies listed are those determined in previous studies as needed by persons employed in horticultural occupations. Instructional aids and references are listed for each unit.

A list of titles of occupations requiring competencies in horticulture has been included in the guide. It is assumed that only partial attainment of some competencies can be done at the secondary level. The competencies may not be mastered until the student has completed additional preparation at the post-secondary, young or adult class, or collegiate levels. It is assumed that "hands on" and occupational experience will be provided with class and laboratory instruction at all levels.

Evaluation of the instruction in horticulture should be based largely upon attainment of the competencies listed in this guide, and on the application of them as students participate in occupational experience programs.

Allocations of units and of instructional time in the four-year sequence of courses at the secondary level are presented in the curriculum guide titled, Agribusiness and Natural Resource Education. Also presented are suggested activities involving horticulture for teachers at the kindergarten through sixth grade level, and suggested outlines of subject matter to be included in exploratory programs at the junior high school level.

Curriculum Guide, Horticulture was prepared by Thomas E. Hensley, Teaching Assistant, Horticulture Department ISU (Committee Chairman); John U. Okorie, Graduate Student ISU; and by Donald E. Showell, Horticulture Instructor, North County Technical School, Florrisant, Missouri.

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This curriculum guide represents the best thinking of a select group of vocational agriculture teachers. It is the result of the pooling of knowledge and experience, and much research of curriculum developments in other states, by 22 men enrolled in Ag Ed 593D, Workshop in Curriculum Development in Agribusiness and Natural Resources during June 1973.

Much credit is due the members of a steering committee which met for three sessions in advance of the workshop to determine the areas to be involved and the format to be followed. The following were members of the steering committee:

State Consultant Staff in Career Education - Emeron Dettmann, Gerald Lamers and Elwood Mabon.

ISU Teacher Education Staff - Dr. Harold Crawford, Dr. Bennie Byler, Richard Carter and Dr. Thomas Hoerner.

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OCCUPATIONAL TITLES

Instructional programs based upon content in this guide will prepare individuals for job entry, will upgrade occupational skills, or will prepare the learner for further occupational preparation.

Production Oriented Occupations

Greenhouse Worker
Nursery Worker
Nursery Owner
Vegetable Producer
Greenhouse Worker
Christmas Tree Producer
Turf Producer
Tree Farmer
Greenhouse Owner
Flower Production Employer
Bedder
Vegetable Grower Employee
Fruit Producer
Mushroom Grower
Nursery Employee
Wholesale Flower Producer

Technical Oriented Occupations

Greenskeeper
Agronomist
Equipment Mechanic
Plant Propagator
Lawn Specialist
Tree Surgeon
Tree Sprayer
Tree Pruner
Landscape Architect
Arborist
Pest Control Technician
Inspector
Research
Extension Specialist
Landscape Designer
Landscape Consultant
Plant Breeder
Lab Technician

Sales and Service Occupations

Flower Shop Worker
Florist
Garden Center Manager
Horticultural Products Sales Person
Vegetable Market Manager
Fruit Market Manager
Fruit Market Employee
Floral Arrangement Specialist
Produce Dept. Manager - Grocery Store
Deliveryman
Garden Center Employee

Related Occupations

Landscaping Assistant
Landscape Gardener
Athletic Field Groundskeeper
Teaching (Vo-Ag Instructor)
Industrial Grounds Maintenance Person
Golf Course Employee
City, State and National Park Employee
State Gardener
Highway Maintenance Person
Park Superintendent
Groundskeeper
Park Superintendent
Director of Seed Company
Editor-Horticultural Publications
Landscape Construction
Office Worker
Physical Plant Manager
Chemical Company Representative
Horticultural Equipment Sales
Landscape Contractor
Horticultural Products Broker

HORTICULTURE

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GENERAL OBJECTIVES

Upon completion of the horticulture course the student will have (1) developed an understanding of occupational opportunities in horticulture; (2) developed those competencies which will provide the student with the skills necessary for employment in or management of a horticultural enterprise.

UNITS

Opportunities in Horticulture
Horticultural Plant Classification and Growth
Pomology
Olericulture
Floriculture
Arboriculture
Lawn and Turf Management
Greenhouses
Horticultural Mechanics
Business Procedures
Landscaping

Opportunities in Horticulture

Problem Areas

A. Production oriented occupations
B. Technical oriented occupations
C. Sales and service occupations
D. Related occupations
E. Human relations within the occupations

Competencies and Learning Activities

A. Production oriented occupations

Competencies - students will be able to:

1. Analyze and describe those occupations listed under the production area of horticulture.
2. Determine production opportunities at the local level.
3. Explain the qualifications necessary for success in a given area of production horticulture.
4. Perform some basic skills needed for entry level employment in a selected phase of production horticulture.
5. Compare and contrast production horticulture with other occupations regarding opportunities and requirements.
6. Progress toward a possible vocational choice in the area of production horticulture, or in an area where similar skills developed may be used.
7. Identify available post-secondary institutions for further education in the field of horticulture.

Learning activities:

1. Each student will have a production enterprise (example: home garden or greenhouse).
2. Have students employed in a production phase of horticulture.

3. Have each student develop a report on one particular area of production horticulture which is of interest to that student.
4. Take part in, or present some type of inservice program, for those already employed in production horticulture.
5. Develop a library of materials relating to the field of production horticulture.
6. Establish a micro-production unit (school garden, turf plot, greenhouse), making students responsible for planning, maintenance and sale of crops produced.

B. Technical oriented occupations

Competencies - students will be able to:

1. Analyze and describe those occupations listed under the technical area of horticulture.
2. Determine technical opportunities at the local level.
3. Describe the qualifications necessary for success in a given area of technical horticulture.
4. Perform some basic skills needed for entry level employment in a selected phase of technical horticulture.
5. Compare and contrast technical horticulture with other occupations regarding opportunities and requirements.
6. Progress toward a possible vocational choice in the area of technical horticulture, or in an area where similar skills developed may be used.
7. Identify available post-secondary institutions for further education in the field of horticulture.

Learning activities:

1. Students become employed in a phase of technical horticulture.
2. Develop an educational display explaining opportunities in technical horticulture that can be found on the local, state, and national levels.
3. Each student demonstrate a particular skill needed for employment in a technical occupation.
4. Require each student to interview and report on a person now employed in a technical horticulture occupation.
5. Invite a resource speaker to talk on a technical horticultural occupation; students should be prepared with questions to ask.
6. Students should write to various industries and request information pertaining to technical horticulture jobs. Material collected should be included in horticulture resource library.
7. Make a chart of skills required for employment in the various technical areas of horticulture.
8. Start a co-op within the class that will provide technical services (pruning, fertilizing, propagation, etc.) for the local community.
9. Students may provide an information service through the local newspaper, or on the radio, to assist in solving the public's technical horticulture problems.

C. Sales and service occupations

Competencies - students will be able to:

1. Analyze and describe those occupations listed under the sales and service area of horticulture.

2. Determine sales and service occupational opportunities at the local level.
3. Summarize the qualifications necessary for success in a given area of horticultural sales and services.
4. Perform some basic skills needed for entry level employment in a selected phase of sales and services.
5. Compare and contrast sales and services in horticulture with other occupations regarding opportunities and requirements.
6. Progress toward a possible vocational choice in the area of sales and services in horticulture, or in an area where similar skills may be used.
7. Identify available post-secondary institutions for further education in the field of horticulture.

Learning activities:

1. Estimate landscaping jobs and write out bills of materials.
2. Present sales demonstrations before an audience on a specific product.
3. Calculate percentages and discounts on sales of materials.
4. Make recommendation for pest control relying upon previous product knowledge.
5. Compare cost of products manufactured by different companies.
6. Set up a sales display in one of the local stores.
7. Each student will set up a newspaper advertisement on a specific type of horticultural product.
8. Design and construct a roadside market for display of truck garden crops.
9. Have students bring in lawn equipment for servicing.
10. Calculate cost of providing maintenance service for a person's lawn and then determine what should be charged to show a reasonable profit.

D. Related occupations

Competencies - students will be able to:

1. Analyze and describe those occupations listed under the related areas of horticulture.
2. Determine related occupational opportunities at the local level.
3. Summarize the qualifications necessary for success in a given area of related horticulture.
4. Perform some basic skills needed for entry level employment in a selected phase of related occupations.
5. Compare and contrast related horticulture occupations with other occupations regarding opportunities and requirements.
6. Progress toward a possible vocational choice in a horticultural related occupation, or in an area where similar skills may be used.
7. Identify available post-secondary institutions for further education in the field of horticulture.

Learning activities:

1. Have students research and teach a unit for classmates on some phase of horticulture.
2. Have the class present an inservice program for elementary grade teachers on horticulture.

3. Publish a horticultural newsletter with students serving as staff members.
4. Students are to design an educational brochure, listing the occupational requirements of horticultural occupations, for distribution to the general public.
5. Develop a bulletin board describing how horticulture can be included in other teaching fields (biology, botany, science, etc.).
6. Invite resource people from related fields of horticulture to speak to the class.
7. Visit a horticulture related industry, observe the research being conducted and report on how it relates to horticulture.
8. Construct an exhibit to acquaint the public with the many opportunities in horticulture (may be set up in a downtown store window).

E. Human relations within the occupations

Competencies - students will be able to:
1. Explain the importance of dealing honestly with customers and fellow workers.
2. Recognize the need for skill in corresponding with others.
3. Successfully complete an interview with the employer of a horticultural industry.
4. Determine the proper attitude needed to effectively compete in the field of horticulture.
5. Identify his or her areas of interest and pursue them according to ability.

Learning activities:
1. Have each student prepare for, participate in, and evaluate an interview.
2. Practice selling products to customers in the classroom (students will play the roles of customers and salespersons).
3. Invite the guidance counselor to discuss with students the need for proper attitudes in dealing with people.
4. Each student will research an area of interest and compare what was found with what he or she thought it would be.
5. Each student will write a letter of application to a prospective employer in the field of horticulture.
6. Write a report titled, "Why I'm Interested in an Occupation in Horticulture."

Instructional Aids
1. Exploring Turfgrass Occupations, set of 30 slides, Penn State University.
2. Careers in Ornamental Horticulture, 50 frame filmstrip, California State Polytechnic University.
3. Dynamic Careers Through Agriculture, 16 mm. film - 28 min., Farm Film Foundation, Washington, D.C.
4. Time for Searching, 16 mm. film - 22 min., Modern Talking Picture Service, 1212 Avenue of the Americas, New York, N.Y.

Horticultural Plant Classification and Growth

Problem Areas

- A. Plant classification
- B. Reproduction of plants from seeds (sexual reproduction)
- C. Vegetative production of plants (asexual reproduction)
- D. Growth and development of plants
- E. Pest control
- F. Soils and soil mixes

Competencies and Learning Activities

A. Plant classification

Competencies - students will be able to:

1. Identify plants by general structural arrangement.
2. Determine areas of world origin for specific plants.
3. Indicate geographical distribution of specific crops.
4. Classify plants according to botanical families.

Learning activities:

1. Students identify horticultural plants by using plant keys on field trips to view local flora.
2. Mount a collection of plants and plant parts to be used in classroom discussion.
3. Using number two above, have students give talks to local organizations concerning types and history of local flora.
4. Have each student write an article on one specific type of local plant and have it published in the local newspaper.
5. Develop a world map showing horticultural plants and their world origin.
6. Construct a diagram showing the family tree of a specific botanical family.
7. List and classify local plants according to cool and warm seasons.
8. Develop a schedule of planting and maturity dates, to be used by students in their home garden enterprises.
9. Construct a bulletin board showing adaptation of plants to specific North American geographical locations and environmental conditions.

B. Production of plants from seed (sexual)

Competencies - students will be able to:

1. Select and test seed for germination and viability.
2. Mix propagation media used in seed germination.
3. Recognize environmental factors needed for proper seed germination.
4. Explain planting procedures for specific seeds.
5. Analyze seed parts and the function of each.
6. Explain the proper storage methods for seeds.
7. Explain pollination in relation to seed production.

Learning activities:

1. Construct flats for germinating seeds.
2. Mix proper growing media for each type of seed to be germinated in flats.

3. Have each student plant various types of seeds and keep record of progress (example: germination, emergence, first true leaf, etc.).
4. Have each student dissect a different type of seed and compare component parts.
5. Plant specified seeds at different depths and have students record results.
6. Conduct seed germination tests using germination chamber or wet towel method.
7. Student will demonstrate self- and cross-pollination procedure used in seed production.
8. Conduct seed storage experiments; use the same seed under different storage conditions. Have student record his observations.
9. Make a seed collection and label individual seeds with the common and botanical names. (Collection may be in the form of some specific art design. Example: flower, wheel, etc.)

C. Vegetative production of plants (asexual)

Competencies - students will be able to:

1. Propagate plants by using specialized plant parts and structures.
2. Recognize the necessity for the use of vegetative propagation.
3. Determine the environmental factors necessary for each type of vegetative propagation.
4. Identify the types of vegetative propagation and the plants utilizing each type.
5. Explain the function and use of substances which promote root development.
6. Correlate vegetative propagation processes with growth and development of a plant.

Learning activities:

1. Prepare propagation media and root designated types of cuttings.
2. Perform proper grafting procedures on various types of local hardy woody plants.
3. Visit local nursery and have students observe and participate in seasonal propagation procedures.
4. Make fall cuttings of woody plants and store properly through the winter for spring field planting.
5. Demonstrate proper use and maintenance of vegetative propagation equipment.
6. Construct a display showing what a clone is, why they are needed, and what plants belong to them.
7. Demonstrate proper methods of layering and division. Make a list of plants using each.
8. Construct a bulletin board showing types of naturally occurring vegetative reproductive structures (bulbs, tubers, corms, etc.). Give examples and indicate corresponding cultural practices.
9. Have students dissect the different types of naturally occurring vegetative reproductive structures and compare the differences and similarities.
10. Use hormones vs. not using hormones in woody plant rooting experiments. Tabulate results.

D. Growth and development of plants

Competencies - students will be able to:
1. Distinguish between young and mature growth of plants.
2. Explain apical dominance and its effect on growth habits.
3. Determine effects of environmental factors on plant growth.
4. Analyze the use of growth regulators on commercial production.
5. Explain the different life cycles of plants.
6. Identify basic anatomical plant structures.

Learning activities:
1. Construct a diagram showing various stages of plant growth.
2. Collect specimens showing juvenile and mature stages of plant development while on a field trip.
3. Perform experiments to show reaction of growing plants to changes in light intensity, quality and direction.
4. Perform experiments using methods of growth regulation, pinching, disbudding, chemical regulation, etc.
5. Obtain a cross-section of a tree and have students label it as to age, wood type, cell structure and type, etc.
6. Conduct a discussion to determine what students know of plant growth and development.
7. Visit greenhouses and have students observe and correlate cultural activities which correspond to different stages of plant development.
8. Each student will diagram and label a cross section of a herbaceous plant as viewed under a microscope.

E. Pest control

Competencies - students will be able to:
1. Differentiate between harmful and beneficial insects.
2. Explain the life cycle of pests and how they are used in controls.
3. Diagnose plant pest problems by identifying the symptoms.
4. Classify pesticides according to biological and chemical methods.
5. Determine proper preventative control measures.
6. Recognize danger of improper use of pest control.

Learning activities:
1. Construct a butterfly net and have students make an insect collection.
2. Students construct protective devices (example: wire mesh barriers around apple trees to discourage rabbits) as a community service.
3. Conduct a community safety program on the proper use of pest controls.
4. Perform Dutch Elm disease test on branches brought in by students from their home.
5. Make a field trip to identify local weeds and have students obtain specimens for use in classroom collection.
6. Develop a spray schedule for plants found in the students' home area.
7. Have each student collect five plant problem questions from people in the community and do research to answer these questions.
8. Special projects, research; example: survey community to find out what pests are most common.

9. Write articles on methods of pest control and have published in the local newspaper.

F. Soils and soil mixes

Competencies - students will be able to:

1. Recognize the importance of soil testing to horticultural crop production.
2. Identify types of fertilizers and their application.
3. Determine and select the types of growing media needed for different horticultural crops.
4. Understand the reasons for component parts of soil mixes.
5. Explain need for the principle of soil sterilization and pasteurization.
6. Explain the proper methods of watering plants relative to various soil types and mixes.
7. Summarize basic soil concepts.
8. Explain the use of hydrophonics in horticulture.

Learning activities:

1. On a soil sample from the student's home lawn or garden, run a complete soil test.
2. Run separate sediment tests on soil with high organic matter, silt soil, clay soil and sandy soil. Record the results.
3. Prepare a typical sterilized soil mix used in pot plant production.
4. Grow similar plants in pots having different fertilizer ratios. Students should determine what is deficient and how it can be corrected.
5. Prepare a hydrophonic (soilless culture) demonstration and grow plants in the proper nutrient solutions.
6. Put on a demonstration for a local organization (Garden club) on the proper soil mixes and watering methods for house and garden plants.
7. Construct a display showing the physical properties (capillary action, porosity, etc.) and their effect on water movement.
8. Have students build a sterilizer to be used for classroom instruction.
9. Prepare and apply the proper fertilizers for growing potted plants as indicated by soil tests.

Instructional Aids

1. Foliate Plant Identification, Part I and II, Vocational Agricultural Service, University of Illinois.
2. What's in the Bag, 18 min. film, National Fertilizer Association, 616 Investment Building, Washington, D.C.
3. Weed Identification Mounts, National Agriculture Supply Co., Ft. Atkinson, Wisconsin.
4. Botany Series, Transparencies: 3M Company, Minneapolis, Minnesota.
5. Preparing Potting Materials, film strip, Vo Ag Service, University of Illinois.
6. Transparencies and duplication masters, Vocational Horticulture I and II, Ag Ed Department, University of Minnesota.
7. Transparencies and duplication masters, 50 Laboratory Exercises, Interstate Printers and Publishers.

Pomology
(Fruit Production)

Problem areas

A. Introduction to fruit production
B. Flowering, fruiting and growth habits
C. Tree fruits
D. Small fruits

Competencies and learning activities

A. Introduction to fruit production

Competencies - students will be able to:

1. Contrast the economic importance of fruit production on a local, state, national, and international level.
2. Identify the major fruit crops produced commercially.
3. Classify varieties of fruits according to anatomical structures (common and botanical names).
4. Recognize geographical distribution of fruit crops and recognize how environmental factors affect that distribution.
5. Assess the present trends of fruit consumption and harvesting and their effects on future production.

Learning activities:

1. Prepare a written report on the use of marketing cooperatives.
2. Give identification tests over the botanical structure and fruiting characteristics of tree fruits.
3. Develop a set of charts graphing yearly trends of each of the major fruit crops and have students evaluate reasons for these changes.
4. Grow a pomology crop under different environmental conditions and have students record and evaluate results.
5. Indicate by symbols on a map of the U.S. where each of the major crops are grown.
6. Survey community and determine economic importance of fruit production on the local level.
7. Develop a bulletin board showing fruit production in foreign countries.
8. Develop a section in your school library relating to fruit production.
9. Compare incomes derived from various other crops with fruit crops by the acre and total production.

B. Flowering, fruiting and growth habits

Competencies - students will be able to:

1. Identify flower types and the parts specific for each type.
2. Recognize stages of and factors affecting flower bud formation.
3. Describe the process of pollination and the environmental factors necessary.
4. Use natural and mechanical pollinators.
5. Distinguish between the growth and fruiting habits of tree crops, bush crops and vine crops.
6. Use chemical methods of forcing plants to fruit.

Learning activities:

1. As a class project, have students photograph, sketch and mount various plant parts to be included in a plant identification book.
2. Dissect and compare flowers and fruits of several types of fruit crops.
3. Visit an orchard and have students compare various stages of plant development in relation to production.
4. Have students grow examples of different varieties in containers which may be used in classroom comparison of growth habits.
5. Show film on flower, fruiting and growth habits.
6. Have students graft scion to understock and explain how it affects growth habits of various fruits.
7. Prepare a bulletin board showing pictures (cut from catalogs) of fruits classified under the categories of tree crops and small fruit crops.
8. Develop a 5 in 1 apple tree to improve skills in grafting. Use as an example for comparing flower types of different varieties.
9. Have students mechanically pollinate blossoms of several fruit trees.
10. Apply chemical compounds to induce the setting of fruits.

C. Tree fruits

Competencies - students will be able to:

1. Identify different varieties of tree fruit.
2. Perform maintenance practices in the management of tree fruit plantings.
3. Select fruit production sites.
4. Judge tree crops according to grade, size and quality.
5. Select and use the proper propagation techniques for different types of tree crops.
6. Determine proper stages of fruit maturity by sensory evaluation.
7. Apply appropriate fruit and drought control methods.
8. Recognize the role of nutrient elements, their deficiency symptoms and their common causes.
9. Use proper equipment to improve the efficiency of fruit crop production.
10. Recognize pests which affect fruit crops and the suggested method of control.

Learning activities:

1. Complete sorting, grading and identification charts on various fruits.
2. Locate and stake out productive sites taking into consideration soils, air drainage, sun and wind.
3. Grade and prepare fruit for county and state exhibits.
4. Chart the life cycle of common insects and pests which are troublesome to fruit crops. Recommend control measures.
5. Test soil samples.
6. Students will be allowed to practice cultural methods which will be beneficial in the harvesting of tree fruits.
7. Restore old fruiting trees by grafting and re-planting.
8. Visit an orchard and participate in planting, pruning, spraying and harvesting of fruit.

9. Train a fruit bearing tree using espalier methods and use as an ornamental planting.

D. Small fruit

Competencies - students will be able to:

1. Perform maintenance activities necessary for small fruit production.
2. Identify the different kinds and varieties of small fruit.
3. Select planting stock which is hardy for the local area.
4. Grade, size and package fruits.
5. Recognize picking maturity of different small fruit crops.
6. Propagate small fruits.
7. Select and apply proper pest controls to small fruits.
8. Identify nutrient deficiencies and apply corrective measures.
9. Operate and maintain equipment used in producing small fruits.

Learning activities:

1. Work with local commercial small fruit growers and prune, transplant and train plantings.
2. Select and collect samples of fruiting wood which shows disease and pest damage. Make recommendations for preventive maintenance of the disease or pest.
3. Grade, sort, and exhibit small fruits during production seasons.
4. Apply pest control chemicals to small fruit crops.
5. Build a strawberry barrel or pyramid.
6. Raise an acre of strawberry plants as a money making project.
7. Build a trellis and establish a grape planting of several varieties.
8. Collect recipes which use various fruits and develop a cookbook.

Instructional aids

1. Fruit Production Unit, two-year program in Vocational Horticulture, University of Minnesota.
2. Modern Fruit Science, Lab Manual, Rutgers University.
3. 50 Laboratory Exercises, Master transparencies, Interstate Publishers.
4. Fruits of the North, 23 min film, University of Minnesota.
5. Fruits of a Lifetime, 26 min. film, University of Minnesota.
6. Know your Kinds of Fruit and Vegetables, 73 slides, University of Minnesota.
7. Small Fruit Diseases, 50 slides, University of Minnesota.

Olericulture
(Vegetable Production)

Problem Areas:

A. Introduction to vegetable production
B. Types of production
C. Growing, hardening and transplanting
D. Pest control
E. Harvesting and storage

Competencies and Learning Activities

A. Introduction to vegetable production

Competencies - students will be able to:

1. Classify vegetables according to botanical families, use, adaption to environment and proper seasons of growth and development.
2. Recognize the scope, importance and changing trends of the vegetable industry.
3. Identify the major vegetable-producing areas.
4. Describe the history of vegetable production on the local, state and national level.
5. Recognize the personal factors needed for success in vegetable farming.
6. Differentiate between vegetables raised for leaves, flower parts or stems, underground parts, and fruits or seeds.
7. Recognize the influence of foreign vegetable markets on domestic production.

Learning activities:

1. Take students to USDA office and have them collect statistics on local production of vegetables and compare to production of other crops.
2. Have each student buy one type of vegetable from the local grocery store and write a report on it to be given before the class.
3. Develop a vegetable exhibit using the actual product and label each type.
4. Visit the local grocery store and have students identify the various types of vegetables on display.
5. Have each student send to several seed companies requesting their catalogs. Use them as references when discussing individual crops.
6. Construct a relief map of the United States and have students label the major production areas for each type of vegetable. (Label with a small reproduction of the vegetable being discussed).
7. Have students plan and cook a dinner consisting of only vegetables (co-operate with the Home Economics department).
8. Have each student develop a line graph showing the variation in yield of a particular vegetable over the last 50 years.
9. Assign each student one vegetable crop, follow the price in the newspaper and chart the fluctuation with the purpose of determining causes for price changes.

B. Types of production

Competencies - students will be able to:

1. Explain the various types of vegetable production (Home gardening, Market gardening, Truck gardening, Vegetable seed production, etc.)
2. Recognize why home gardening in recent years has been on the increase.
3. Indicate the factors (transportation, refrigeration, etc.) affecting the growth or decline of each type of vegetable production.
4. Describe the specific vegetables raised in the various types of production.

5. Recognize those types of production which are best suited for the local area.
6. Identify the geographical locations in the U.S. which are best suited for each production type.
7. Use equipment required to effectively carry out each type of vegetable production.

Learning activities:

1. Construct models of each type of vegetable production.
2. Visit a commercial operation and allow students to observe the production techniques used.
3. Survey the local area, find out those types of production presently in operation and suggest production operations which may be established.
4. Start a market garden as an FFA co-operative venture and sell products as a fund-raising activity.
5. Determine production costs under each type and determine vegetable prices needed to show a reasonable profit.
6. Develop a bulletin board showing the various types of vegetable production and what is involved in each.
7. Experiment with seed production by allowing each student to plant and grow to seed stage some varieties of vegetables.
8. Have the FFA lease some land and rent small plots to local residents making students responsible for the care of the garden.
9. Interview with a large commercial vegetable grower by phone. Have students ask questions which they have previously written.

C. Growing, hardening and transplanting

Competencies - students will be able to:

1. Compare the techniques of growing vegetables undercover as opposed to open field production.
2. Construct structures used in producing vegetable crops under cover.
3. Grow those vegetables generally started or completely produced under cover.
4. Hardening off plants under cover that can be moved to an open field type of production.
5. Properly transplant vegetable crops.
6. Plant seeds during optimum environmental conditions for best results.
7. Prepare soil for bedding plants.
8. Select and apply proper fertilizer based on soil tests and types of vegetable being grown.

Learning activities:

1. Select a type of seed, prepare a seed flat, plant and raise the vegetable.
2. Construct cold frames on school grounds, place seed flats inside to be raised and sold as bedding plants in the spring to local residents to use in their gardens.
3. Demonstrate to a local organization (e.g. - garden club) the proper procedures for growing, hardening and transplanting vegetables.

4. Conduct an experiment in which half the class raises vegetables and plants them without hardening, the other half hardens plants. Compare the results.
5. Visit a greenhouse and allow students to view the procedure used for growing bedding plants.
6. Contact agencies (seed companies, extension, etc.) and request material related to vegetable growing which may be added to the department's horticultural library.
7. Develop a booklet explaining proper gardening procedures that will be made available to local residents - a possible money-raising project.
8. Develop a school garden and make each class member responsible for planting, cultivating, watering and harvesting of one type of vegetable crop.
9. Make a chart showing the nutritional value of the major vegetable crops produced in the local area.

D. Pest control

Competencies - students will be able to:

1. Recognize the importance of proper pest control for highest yield.
2. Use proper cultivation practices for most efficient control of weeds.
3. Select and apply available pesticides and herbicides.
4. Identify and control common pests affecting local gardens.
5. Use soil sterilization and seed treatment in eliminating pest problems.
6. Use sanitary procedures when growing vegetables under cover and in containers.
7. Recommend preventative programs as well as corrective pest control measures.

Learning activities:

1. Make a collection of pests (pictures or actual specimens) to be used in classroom identification.
2. Write newspaper articles or radio programs to inform the public of pest control measures.
3. Visit local gardens and have student identify problems and make recommendations as to control.
4. Develop a spray schedule to fit the needs of each student's home garden.
5. Conduct an experiment to show the relationship between proper use of pest controls and yields. Select a variety of snap bean and grow it under various pest control conditions (e.g. no controls, proper controls, only herbicides, etc.) and compare the results.
6. Invite the representative of a chemical company to speak to the class on proper use and safety of pesticides.
7. Provide a community service of identifying various pests in the local area for community residents.
8. Compare flats containing various combinations of sterilized soil, non-sterilized soil, treated seeds and non-treated seeds (e.g. pot #1 contains sterilized soil, untreated seeds; pot #2 contains non-sterilized soil and treated seeds). Compare the growth of all combinations.

E. Harvesting and storage

Competencies - students will be able to:

1. Harvest and store vegetables when they have the proper appearance, texture and flavor.
2. Determine the best time to harvest each type of vegetable crop.
3. Grade harvested crops and determine the change in a grade due to improper harvesting and storage.
4. Operate vegetable handling equipment.
5. Package and store vegetable crops.
6. Use best environmental condition for storing various vegetable varieties.
7. Properly transport various vegetable crops to market.

Learning activities:

1. Visit a vegetable grower and have students participate in harvesting.
2. Compare proper and improper methods of storage (e.g. put a tomato in the classroom and one in the refrigerator, after 5 days, compare).
3. Determine the quantity of vegetables they can pick in an hour (pick school garden) and compare that number with the amount a machine can harvest in the same time.
4. Conduct a judging contest among students. Select vegetables representing all grades and have the class judge the various qualities.
5. Visit the produce area of the local grocery store and observe how retail businesses overcome the deterioration problems of vegetables.
6. Inform public (by means of newspaper, radio, etc.) how they can better store homegrown garden vegetables for increased longevity.
7. Visit railroad or trucking companies and allow students to observe and ask questions concerning transporting perishable items.

Instructional Aids

1. The Home Vegetable Garden, slides, University of Minnesota.
2. Tips on Transplanting Tomatoes, 14 min. film, University of Minnesota.
3. Know Your Kinds of Fruits and Vegetables, slides, University of Minnesota.
4. For Your Potato Pleasure - The Marketing Story, 12 min. film, University of Minnesota.
5. Fruit and Vegetable Film Directory, United Fresh Fruit and Vegetable Association.

Floriculture
(Flower Production)

Problem Areas

A. Job entry in floriculture
B. Potted plant production
C. Cut flower production

D. Flower arranging
E. Retail flower shop operation

Competencies and Learning Activities

A. Job entry in floriculture

Competencies - students will be able to:
1. Identify occupational opportunities in floriculture and greenhouse production.
2. Select a greenhouse location and oversee construction of structures and equipment installation.
3. Manage environmental controls and control systems which are necessary for crop production.
4. Schedule cropping programs so that production will be in line with seasonal demand for finished products.
5. Understand the problems which may arise in the operation of a greenhouse.

Learning activities:
1. Each student during the year will act as plant manager within the horticulture class, delegating work and responsibilities to be assumed by students.
2. Make out a time schedule for the year's production of greenhouse plants.
3. Role play a physical plant manager for a designated period.
4. Student serve as section or group foreman in the production area of the greenhouse.
5. Present an overview of the jobs which have to be handled as a grower, wholesaler, retailer or designer.
6. Students will attend growers marketing meeting to observe problems and marketing trends.
7. Students will maintain running inventories of supplies and materials which are used in the greenhouse and flower shop.
8. Students will attend seminars on business management and advertising.
9. Conduct a field trip to a large commercial greenhouse and flower shop to observe workers in different situations.
10. Students will participate in the production of cut flowers for a wholesale market.

B. Potted plant production

Competencies - students will be able to:
1. Maintain proper environmental control in a greenhouse to produce potted seasonal plants.
2. Select cultivar and maintain crop rotations.
3. Operate timing devices and control lighting for short and long day sensitive plants.
4. Maintain fertilizer and soil conditions needed for optimum growth in the shortest period of time.
5. Use chemical and mechanical methods of regulating growth of seasonal plants.
6. Use biological and chemical means of controlling diseases and pests in the greenhouse.

Learning activities:

1. Resource person discuss the importance of atmospheric control, temperature control, heating and cooling systems, refrigeration and humidity controls on greenhouse crops.
2. Students use plumbing tools and install a greenhouse irrigation system.
3. Students make soil mixtures for the specific greenhouse crops which are to be grown.
4. Students use watering and fertilizing equipment in the greenhouse.
5. Students make soil tests and fill out soil test sheets.
6. Assign individual potted plants to students for maintenance and proper management.
7. Assign students preventive maintenance schedules for disease and pest control within the greenhouse.
8. Students participate in a safety poster contest in the handling and use of pesticides and insecticides.
9. Use fertilizer proportioners in applying fertilizer to crops.
10. Students identify the lack of nutrients by signs given by the plant and determine the method of correcting such a deficiency.
11. Identify 20 cultivars which are generally used in greenhouse production.
12. Run an experiment by lighting one group of plants and not lighting another group. Record the bloom results.
13. Calculate the number of pots needed for a crop rotation on the bench space provided in the school greenhouse.
14. Students make up a glossary of terms which are used in the greenhouse and about plants and plant parts.

C. Cut flower production

Competencies - students will be able to:

1. Prepare a full year rotation plan for cut flowers.
2. Prepare soil for different cut flower crops.
3. Plant rooted cuttings and seedlings.
4. Identify four groups of cut flowers and explain how they differ from each other within groups and between varieties.
5. Control temperature in growing cut flowers.
6. Control day length changes on photoperiodic greenhouse plants.
7. Space flowering plants in benches and beds according to recommendations.
8. Control temperatures for different kinds and varieties of cut flowers.

Learning activities:

1. Demonstrate the proper preparation of the soil used in the bench or bed for growing cut flowers.
2. The students will pinch and disbud flowering plants.
3. Class work out a one-year rotation plan for cut flower production.
4. Students plant cut flower rooted cuttings and seedling plants using proper spacing.
5. Teams of students will control light and temperature in the culture of cut flowers.
6. Students will propagate flowering or cut flower plants from cuttings.

7. Each month students will rotate the testing of soil in the benches and beds.
8. Pest control will be done by students on a weekly basis.
9. Students will identify the most common diseases and pests in the production of cut flowers.
10. Students will harvest crops of cut flowers.

D. Flower arranging

Competencies - students will be able to:
1. Appraise the uses and characteristics of flowers, plants and decorative materials.
2. Design with flowers and decorative materials.
3. Use flower arrangements in the home, business and weddings.
4. Merchandise and sell arrangements and potted plants.
5. Calculate and figure price markup and net profit.

Learning activities:
1. Students will price and determine availability of products of the trade.
2. Students will have the opportunity to recognize basic materials which are used to make floral arrangements.
3. Each student will make floral arrangements emphasizing construction, line and focal points.
4. Students will enter class competition in making designated type and style of floral arrangement.
5. Take a field trip and observe prices, supplies and procedures at a wholesale florist supply company.
6. Students will work with professional designer in the classroom or the flower shop.
7. Students will make arrangements, decorate potted plants and supply other offices and classrooms with fresh and cut flower arrangements.
8. Set up a cut flower and decorative unit. Make a floral garden for viewing by the general public.
9. Students will participate in local and state floral design schools which are conducted by commercial organizations.
10. Show movies and film strips to acquaint students with design work which is being conducted in other locations.

E. Retail flower shop operation

Competencies - students will be able to:
1. Merchandise flowers to the best advantage.
2. Sell flowers to the general public.
3. Develop advertising and promotion programs and estimate cost of designing materials.
4. Calculate the earnings made after costs have been deducted from the selling price.
5. Identify customer needs and desires for a particular situation or occasion.

Learning activities:
1. Each student prepare an advertisement for flowers for the newspaper or radio.

2. Prepare window displays for selling flowers in a retail shop. Use the school trophy display.
3. Use the teleprompter to simulate flower order taking.
4. Each student will accept an order, design the arrangement and calculate the cost of materials and net profit.
5. Compare the advantages of the world-wide florist delivery services.
6. Keep records of work which has to be done in the flower shop and how the work is to be expedited.
7. Each student set policies and make decisions as to how the work is to be completed on a weekly basis.
8. Students will take orders for prom and other school activities and fill these orders as a money making project.
9. Conduct a field trip to a retail flower shop to observe the shop layout. Each student will then draw a plan for a typical or ideal shop for his own use.

Instructional Aids

1. Greenhouses and Related Structures- Agdex 200/70 1967 Slides
2. What's in a Bag (18 min. Film), National Fertilizer Assn.
3. Watering and Feeding, slides, Ag. Ed. Service, Columbus, Ohio.
4. Commercial Catalogues, George Ball Inc., Yoders Mums.
5. The Wonderful Words of Flowers, Film, Society of Am. Florists.
6. Florist Plant Material, slide set, Ag. Ed. Dept., Penn State U.
7. Arranging Flowers in Your Home, 30 min. movie, Cornell U.

Arboriculture
(Tree and Shrub Culture)

Problem Areas

A. Introduction to trees and shrubs
B. Growth and development of trees
C. Diagnosing and treating tree and shrub problems
D. Tree maintenance
E. Kinds of nurseries
F. Methods of propagating and growing nursery stock

Competencies and Learning Activities

A. Introduction to trees and shrubs

Competencies - students will be able to:

1. Identify common varieties of trees and shrubs based on structural arrangement.
2. Recognize the importance of trees and shrubs in the ecological and economical areas.
3. Indicate hardiness areas in the U.S. and trees and shrubs adapted to each zone.
4. Differentiate trees according to uses.
5. Summarize the need for people trained in the growth and care of trees and shrubs.
6. Describe the scope of the nursery industry in Iowa.
7. Describe the anatomical functions of trees and shrubs, and how they differ from herbaceous plants.

Learning activities:

1. Draw a map of Iowa and indicate hardiness zones applicable, trees and shrubs most commonly grown, and areas of major nursery production.

2. Collect tree and shrub leaves, mount and place in an identification book to be used in the classroom.
3. Construct a display to acquaint the public with the ecological advantages of trees (deterrents of sight, sound and odor pollution.)
4. Plan a field trip and have students identify several types of trees found in the local community.
5. Have students label all trees and shrubs found in the school area.
6. Have students photograph local trees and shrubs and develop a slide set to be used in identification.
7. Construct a bulletin board showing the development of wholesale and retail nursery operations in the U.S.
8. Build a demonstration board showing the different types of wood.
9. Have student obtain cross-sections of various tree varieties and label various growth rings according to historical facts of that time.

B. Growth and development of trees and shrubs (see also - Natural Resources)

Competencies - students will be able to:

1. Identify and explain the functions of various tissues and organs found in woody plants.
2. Describe the process enabling stems and roots to increase in length and in diameter.
3. Indicate how woody plants photosynthesize and use food.
4. Explain how water and nutrients are absorbed and moved throughout the plant.
5. Define transpiration and explain its effect upon the surrounding area.
6. Recognize the relationships between tree growth and different soil conditions.
7. Relate the effect of environmental factors on growth and development of trees and shrubs.

Learning activities:

1. Strip a section of bark from tree, inject red dye to indicate fluid movement (dye should move upward and be visible on bare section of tree).
2. Have each student select a small evergreen tree and dwarf it by severely pruning root and top growth (this type of tree is called bonsai).
3. Assign each student several new terms associated with growth and development and have him or her research the definition.
4. Dissect a root cap and/or a stem tip and diagram and label each.
5. Start a variety of tree or shrub seed in a container having one glass side. Make observations weekly to record and compare root and shoot development.
6. Make a chart showing the cyclic processes involved with oxygen, carbon dioxide, and water.
7. Perform the iodine experiment on starch formation due to photosynthesis and the relationships of light (see Nursery Worker, Part I) .
8. Conduct experiment to determine the effect of wind on transpiration-weigh two pots containing geraniums, cover soil surface with plastic, place one pot in no wind and one in front of fan, weigh and record daily.

9. Plan and maintain a test plot for trees and shrubs.
10. Visit a nursery and allow students to identify and observe woody plants in various stages of development.

C. Diagnosing and treating tree and shrub problems

Competencies - students will be able to:

1. Treat mechanical injuries of trees and shrubs.
2. Differentiate between environmental problems that may affect woody plants (example - nutrient deficiencies, moisture and soil aeration disorders).
3. Recognize the increasing hazards for trees as a result of air pollution.
4. Determine to what extent a woody plant is affected by a disorder and decide whether or not removal is appropriate.
5. Identify pests (insects, borers, rabbits, etc.) and recommend possible treatments.
6. Recognize symptoms and identify the diseases possible.

Learning activities:

1. Provide diagnosis and treatment of unhealthy trees in the local area as a community service project.
2. Establish a control program for a specific pest or disease in the local area.
3. Collect and mount parts of unhealthy plants found in the local community.
4. Develop a radio program to inform the public concerning preventative measures and treatment procedures if necessary.
5. Give a demonstration of control measures at a regularly scheduled FFA meeting.
6. Have class develop a trouble-shooting guide to be used in determining plant ailments.
7. Make a survey of the local community to determine how extensive the Dutch Elm disease is and recommend possible treatment.
8. Conduct a contest; give awards for the most pests brought in by an individual student.
9. Tour class members' farms and identify unhealthy trees and shrubs.
10. Visit a research unit (college, extension, etc.) and have a plant pathologist explain what is being done to eradicate various types of plant problems.

D. Tree maintenance

Competencies - students will be able to:

1. Prune trees and shrubs.
2. Recognize the need for some winter protection and explain methods used.
3. Explain why young plants need to be protected from sunburn and how it is prevented.
4. Repair mechanical wounds in woody plants.
5. Describe the proper procedure for removing a tree.
6. Perform proper planting procedures with regard to spacing, setting, soil conditions, mulching and watering.
7. Calculate fertilizer need in relation to soil type and plant location.
8. Select appropriate equipment for various maintenence tasks.
9. Recognize the need for safety-consciousness when performing maintenance tasks on plants.

Learning activities:

1. Plant and maintain ornamental trees and shrubs on the school grounds.
2. Visit a nursery or tree farm and have students participate in maintenance practices.
3. FFA may establish and maintain Christmas tree farm as a fund-raising project.
4. Demonstrate proper pruning techniques to one of the local service organizations.
5. Have students video-tape a series of demonstrations on proper tree and shrub maintenance. Make the set available to the public.
6. Participate in the removal of dead and dying trees.
7. Conduct a workshop on tree climbing to include ropework, knots, techniques, skills and use of ladders.
8. Visit a tree surgeon and have him demonstrate the various skills needed.
9. Develop a test plot to compare and analyze good versus poor maintenance techniques.

E. Kinds of nurseries

Competencies - students will be able to:

1. Recognize the differences between wholesale and retail nurseries.
2. Differentiate between kinds of nurseries according to the type of market they produce for.
3. Identify the types of plants grown in different kinds of nurseries.
4. Indicate criteria determining which type of nursery should be established in a given area.
5. Explain the difference between private (for companies own use), governmental and commercial nurseries.
6. Describe what a plant rental is and how it is used.
7. Explain why some nurseries are a combination of two or more types.

Learning activities:

1. Have students correspond with the different types of nurseries and establish a list of functions performed by each.
2. Write a report describing the characteristics of one particular type of nursery.
3. Organize a game where one group of students is the wholesaler and another group is the retailer. Have each group perform the activities needed for interaction with the other.
4. Take a field trip and allow students to view the different kinds of nurseries in operation.
5. Develop a flow chart showing how nursery stock moves from planting to the consumer.

F. Methods of propagating and growing nursery stock

Competencies - students will be able to:

1. Explain the differences between vegetative and seed production of nursery stock.
2. List the types of vegetative propagation used and explain how each is accomplished.
3. Care for rooted cuttings and seedlings.
4. Transplant,stake and prune nursery stock.

5. Identify proper irrigation methods needed and the equipment used for each.
6. Grow nursery stock in containers and in the field.
7. Use specialized facilities and equipment in propagation of nursery stock.
8. Properly analyze and supply fertilizers.
9. Harvest nursery crops.

Learning activities:
1. Establish a school tree farm. Students will be responsible for all propagation and growing.
2. Visit a propagation nursery and allow students to view the various methods used.
3. Diagram and describe one type of cutting.
4. Mix media, make a chart of transplanting dates and transplant nursery stock (may be ordered in from commercial nursery) into cans they have collected.
5. Make a chart outlining the proper design and spacing for planting various types of nursery stock.
6. Plant one each of the three types of nursery stock (bare root, container, balled and burlapped).
7. Prepare several woody plant cuttings and grow them in classroom or school greenhouse.
8. Plan a crop rotation schedule to allow for successive harvesting.

Instructional Aids
1. Pruning Shrubs, Folder No. 215, North Carolina Extension Service.
2. Trees and Shrubs - Where and How to Plant, Circular No. 392, North Carolina Extension Service.
3. Home Propagation of Ornamental Trees and Shrubs, Bulletin No. 80, USDA.
4. Pruning Ornamental Shrubs, (filmstrip and narration), California State Polytechnic College.
5. Trees and Shrubs, 40 slides, Callaway Gardens Educational Department Pine Mountain, Georgia.

Lawn Turf Management

Problem Areas
- A. Introduction to turf
- B. Establishing a lawn
- C. Maintaining lawns and special turf areas
- D. Renovating a lawn
- E. Identifying and solving lawn and turf problems

Competencies and Learning Activities

A. Introduction to turf

Competencies - students will be able to:
1. Grasp the economic importance of the turf grass industry as compared to other areas of horticulture.
2. Indicate those geographical locations which are best suited for commercial turf production.
3. Categorize grass varieties according to their characteristics and environmental requirements.

4. Identify grasses by their vegetative characteristics.
5. Recognize the anatomical parts of a grass plant.

Learning activities:

1. Make a map indicating areas of major turf production in U.S. and types of grasses best adapted.
2. Collect and mount different types of grass and/or their seeds.
3. Dissect and observe anatomical grass plant parts.
4. Tour community and have students identify and photograph grasses used in the local community.
5. Collect different varieties of grass and grow plants for identification purposes.

B. Establishing a lawn

Competencies - students will be able to:

1. Design new lawn areas.
2. Select proper seed or vegetative stock for a given set of environmental conditions.
3. Analyze soil conditions to determine the proper types of fertilizers and methods of application.
4. Prepare proper bed for vegetative and seed plantings.
5. Seed lawns and establish vegetative plantings.
6. Recognize why physical conditioners may be needed when establishing lawns.
7. Explain why the cost of seed mixtures vary.
8. Explain the regulations covering grass seed sales.

Learning activities:

1. Demonstrate the proper methods of grading, fertilizing and seeding a new lawn.
2. Develop a plan for establishing a lawn which would best fit home situation.
3. Construct a display (for use at fairs or organizational meetings) demonstrating correct methods of establishing lawns.
4. Visit an area being landscaped and have students participate in establishing a lawn (could be used as a community service project).
5. Write a newspaper article acquainting the public with regulations covering grass seed sales.
6. Invite someone experienced in turf establishment to speak to class and have the class ask questions concerning the various methods.
7. Prepare, as a class project, a cost analysis sheet comparing the different methods of establishing a lawn.
8. Develop a fertilizing schedule showing cost, analysis, dates of application and various rates of application used.
9. Run tests on various soil samples taken by students from their lawns. Students determine type of fertilizer needed.
10. Prepare flats and germinate several varieties of grass in the classroom. Students compare germination, growth rate, and vegetative characteristics.

C. Maintaining lawns and special turf areas

Competencies - students will be able to:

1. Properly water turf.

2. Choose the proper analysis and method for fertilizing an established lawn.
3. Control lime and turf pH levels.
4. Recognize the dangers of over-fertilizing a lawn.
5. Roll, rake, and aerate a lawn.
6. Determine proper mowing height.
7. Select and maintain lawn maintenance equipment (mowers, rakes, watering equipment, etc.).
8. Detect and analyze lawn and turf problems (weeds, disease, insects).

Learning activities:

1. Establish a turf demonstration plot and experiment with such things as mowing height, fertilizer applications, grass varieties, etc.
2. Prepare a presentation giving proper mowing methods and equipment.
3. Start a lawn maintenance co-op through the local FFA.
4. Develop a ten minute lawn care program to be given on the local radio station.
5. Design a lawn maintenance schedule for each student's lawn.
6. Demonstrate the proper methods of applying fertilizer, lime and water to lawns.
7. Contract with the school for maintenance of lawns during time that turf and lawn course is taught.
8. Plan a field trip to a local golf course and have the golf course superintendent show students how they manage the greens.
9. Collect and identify weeds (brought in from student's lawns) which interfere with proper lawn establishment.
10. Publish a guide to lawn problems and distribute to people in the local community.

D. Renovating a lawn

Competencies - students will be able to:

1. Discover the reasons a lawn is doing poorly.
2. Explain when a lawn can best be renovated.
3. Renovate a lawn.
4. Identify environmental influence on a lawn and the need for renovation.
5. Indicate the analysis, method of application, and amount of fertilizer needed for poor lawns.
6. Properly mow a newly renovated lawn.
7. Reseed a deteriorating lawn.
8. Properly water a newly renovated lawn.

Learning activities:

1. Plan a field trip to observe lawns in need of repair and have students determine the causes of the poor condition.
2. Conduct a survey of the community and determine the lawns that need renovation, then make suggestions for improvement.
3. Establish a school demonstration plot and illustrate how various control measures can be used to renovate a lawn.
4. Develop an exhibit of the equipment and materials used in renovating a lawn.
5. Repair enough area of a local lawn to enable each student to obtain practice in various renovation procedures.

6. Invite the local extension agent to demonstrate renovation procedures and ask him to make relevant extension bulletins available to students.
7. Obtain questions from local citizens concerning their lawn problems. Have students do research to find the possible answers and report back to the people who submitted them.
8. Obtain dry samples of different types of soil and observe their relation to essential water problems (run drainage tests).

E. Identify and solve lawn and turf problems

Competencies - students will be able to:

1. Identify, prevent and control lawn diseases.
2. Identify and control lawn insects.
3. Identify and control lawn weeds.
4. Recognize the symptoms of mechanical destruction (excessive wear, improper mowing, etc.).
5. Indicate informational agencies which help with the diagnosis of lawn problems.
6. Recognize lawn problems associated with environmental influences (e.g. drought).
7. Properly apply chemicals to prevent harm to lawns.
8. Recognize special problems of turf management associated with public areas (golf courses, parks, etc.).

Learning activities:

1. Observe lawns which exhibit common lawn problems and compare with a problem free lawn.
2. Bring a one-foot square of turf which is diseased or infested and have the class diagnose and suggest treatment.
3. Sponsor a contest on lawn diseases, insects and weed identification (use pictures, slides, or actual samples).
4. Write a paper on the causes, symptoms and treatment of a particular lawn disorder.
5. Visit local garden center or turf production area and have manager display and demonstrate the use of various chemicals and tools used in controlling lawn disorders.
6. Establish a turf demonstration plot. Create and label lawn problems to be used for classroom instruction and public observation.
7. Have students take a core sample of various lawns and compare in relation to compaction, texture, porosity, etc.
8. Use equipment to remedy such things as compaction and thatch.

Instructional Aids

1. Miracle of Grass, film, Union Pacific Railroad.
2. Make the Best of It, film, Visual Aids Service.
3. Beautiful Lawn, 21 minute film, National Plant Food Institute.
4. Turf Care, 17 minute film, Association Films, Inc.
5. Turfgrass Identification, slides, Pennsylvania State University.

Greenhouses

Problem Areas

A. Greenhouse construction
B. Environmental control
C. Plant production
D. Greenhouse management

Competencies and Learning Activities

A. Greenhouse construction

Competencies - students will be able to:

1. Describe the purposes of greenhouses and related structures.
2. Select a location for a greenhouse operation according to land value, soil type, water available, labor and construction materials available, and distance to market.
3. Describe the function of the various greenhouse parts (example - ridge vent, transom sill, rafter, etc.).
4. Recognize the types of greenhouses and explain the advantages and disadvantages of each.
5. Select the construction materials best suited for individual situations (be concerned with climate, funds available, type of production, and land available).
6. Estimate the total cost of the different types of greenhouses.
7. Design and construct the accessory equipment (benches, beds, mist systems, etc.) needed in greenhouse operations.
8. Explain what a head house is, what it is used for, and how it should be constructed.
9. Construct and use special types of greenhouse structures (cold frames, hotbeds, etc.).
10. Select and apply a good glazing material for different types of greenhouses.

Learning activities:

1. Plan and construct a school greenhouse to be used for instructional purposes.
2. Make small greenhouses for home use and sell them as a fund raising project.
3. Divide class into groups and have each group completely design a different type of greenhouse operation.
4. Construct cold frames to be used in conjunction with a school greenhouse for sale of bedding plants.
5. Build a display showing various types of greenhouses and how the home gardener can make use of them.
6. Tour several local greenhouses and have students observe construction techniques and equipment used. Have students suggest specific types of construction and equipment they think could be incorporated into the school greenhouse.
7. Collect and display the various types of construction materials used in greenhouses and label them as to the types of structures each is used for.
8. Construct a scale model of one type of commercial greenhouse operation.
9. Build a wall hanging board showing the different types of wood and methods of preservation used with each. Compare the materials and their life expectancy.

B. Environmental control

Competencies - students will be able to:

1. Explain the reasons for increasing CO_2 content inside greenhouses to influence yield.

2. Explain what is required concerning light intensity and quality; rank covering materials according to their ability to provide the right type of light.
3. Diagram a ventilation system, label air flow patterns through the greenhouse (this could also be done with the other greenhouse systems).
4. Suggest various sources of greenhouse structures and equipment used for environmental control.
5. Sterilize and mix soil best suited for the different types of greenhouse crops.
6. Demonstrate the proper methods of watering various greenhouse crops.
7. Describe the available types of heating and cooling systems which can be used in greenhouse production.
8. Properly shade plants.
9. Set up a workable program of pest control to be used in the greenhouse.
10. Fertilize greenhouse crops.

Learning activities:

1. Assign each student to a specific greenhouse crop. Have him or her care for it from planting to harvesting.
2. Demonstrate shading methods used to obtain proper photoperiod with flowering crops.
3. Have each student design some type of scheduling method for year-round production of greenhouse plants.
4. Build two types of sterilizers to be used in preparing greenhouse soil.
5. Experiment with CO_2 by having two sections in the greenhouse, one with added CO_2 and one without. Observe results in yield.
6. Obtain various types of materials used to cover greenhouses and have students take readings of light intensity and quality after it has passed through the covering.
7. Construct a display board, to be placed in the greenhouse, showing the various greenhouse crops and their environmental requirements.
8. Develop a pest control schedule for use on various greenhouse crops.
9. Conduct experiments showing the effect of day length on flowering plants (Chrysanthemums or Poinsettias would probably work best).
10. Have a resource person from an environmental control systems company demonstrate or explain the types of systems which are on the market for greenhouse operators.

C. Plant production

Competencies - students will be able to:

1. Identify which plants are raised as potted plants, cut flowers, specialty crops and bedding plants.
2. Explain why vegetables may be raised in greenhouse and explain what is involved in each type of production.
3. Prepare beds used in the production of various types of cut flower production.
4. Schedule planting, disbudding, shading, pinching and other plant requirements of seasonal crops so they flower on the desired dates.
5. Raise different varieties of greenhouse plants.

6. Sleeve and pack plants in preparation for shipping.
7. Describe the conditions necessary for longest storage of greenhouse crops (particularly floral crops).
8. Force bulbs to bloom for spring markets.
9. Give examples of greenhouse plants that would work into home greenhouses.
10. Use proper methods of harvesting cut flowers.

Learning activities:

1. Raise and sell seasonal crops (Mums, Poinsettias, etc.) and force bulbs (Tulips, Crocus, etc.) for spring sales.
2. Plant, transplant, disbud and pinch greenhouse plants.
3. Photograph and make a slide series, with script, showing the various greenhouse techniques needed to grow a specific crop.
4. Obtain information from industries that manufacture commercial greenhouse structures. Add the literature to library.
5. Publish a pamphlet to inform the public on the proper procedure for forcing bulbs and care of flowering plants obtained from the greenhouse.
6. Visit a commercial greenhouse and allow students to participate in harvesting and packing cut flowers.
7. Conduct an experiment to show the quality increase with proper disbudding and pinching as compared to plants that were improperly handled.
8. Build a timed mist system for cooling plants, increasing humidity and adding moisture to the soil.
9. Examine plants which are in a turgid condition and compare to those under drought conditions. Diagram the different shapes stomates take with varying moisture conditions.
10. Subscribe to several publications representing different plants (e.g. The American Vegetable Grower) and have students responsible for reporting on new developments and techniques each month.

D. Greenhouse management

Competencies - students will be able to:

1. Develop schedules to coordinate growing activities carried on in a greenhouse operation.
2. Allocate proper amounts of bench space to specific numbers of plants.
3. Develop a plan expanding the market and corresponding increase needed in physical facilities.
4. Determine maintenance needs of greenhouse and design a routine maintenance check of facilities.
5. Project possible crop losses over a growing season and compensate the numbers to meet market demands.
6. Recognize quality plants and control conditions to keep plants at their highest possible quality.
7. Determine total production costs and explain profit-maximizing principles.
8. Compile a list of seasonal crops and match them with appropriate holidays.

Learning activities:

1. Have each student arrange crops in the most appropriate order in a greenhouse taking into account space requirements and time scheduling.

2. Interview a greenhouse manager; have him explain methods he uses for efficient production; students should have questions made up in advance.
3. Collect potted plants illustrating several growth problems; have students determine the grade and recommend possible corrective measures.
4. Students develop a marketing plan for specific types of greenhouse crops for use in the local community.
5. Have students design a workable master schedule indicating employee work hours, activity timing (pinching, budding, etc.) and projected marketing dates.
6. Assign each student a crop in the school greenhouse and have him, or her, determine the total production costs and what must be charged to show a reasonable profit.

Instructional Aids

1. Greenhouses and Related Structures, slide series, Ag. Ed. Curriculum Materials Service, Columbus, Ohio.
2. Colorado Carnations, 26 minute film, Modern Talking Picture Service.
3. Watering and Feeding, 24 slides, Ag. Ed. Curriculum Materials Service, Columbus, Ohio.

Horticultural Mechanics

(See Agricultural Mechanics Guide

Problem Areas

A. Selecting and maintaining hand tools
B. Selecting and maintaining power equipment and accessories
C. Constructing and maintaining horticultural plant support systems
D. Safety

Competencies and Learning Activities

A. Selecting and maintaining hand tools

Competencies - students will be able to:

1. Properly use those hand tools associated with plant maintenance (e.g. pruning shears).
2. Select and use those hand tools associated with general horticultural equipment maintenance (e.g. hammers, wrenches).
3. Demonstrate sharpening procedures on the hand tools requiring the use of a cutting edge.
4. Use and maintain hand sprayers, spreaders and small greenhouse burners and other specialized equipment.
5. Properly store and protect hand tools used in the horticultural industry.
6. Identify hand tools and name the job for which it was intended.

Learning activities:

1. Develop a demonstration on the proper use of tree pruning equipment for FFA contests.
2. Survey home shop and bring in those hand tools in need of maintenance and recondition them in the school shop.
3. Conduct a hand tool repair program and recondition hand tools of local citizens as a community service.

4. Using a horticultural enterprise (garden, nursery, etc.) as an example, have students compile a list of all hand tools needed.
5. Construct simple tools needed in greenhouse operation (e.g. leveling board for flats, dibble board for lining rows and seeding).

B. Selecting and maintaining power equipment and accessories

Competencies - students will be able to:
1. Operate small power equipment (rotary tillers, lawn mowers, hedge shears, etc.) used in various areas of horticulture.
2. Operate large power equipment (tractors, forklifts, trucks, etc.) needed in various horticultural fields.
3. Explain the principles and theory behind the operation of internal combustion engines, electric motors, steam generators, hydraulic systems, pneumatic systems, and other types of power used in horticultural industries.
4. Develop a maintenance schedule for periodic repair and replacements on power equipment.
5. Estimate the cost of operating power equipment and determine how most efficient use of equipment can be made.
6. Outline a plan for constructing storage facilities to protect and prolong the life expectance.
7. Describe adjustment procedures for various types of power equipment.

Learning activities:
1. Pick one phase of horticulture and estimate total cost of buying all the power equipment needed.
2. Visit a local implement dealer and have students observe the equipment applicable to horticultural enterprises.
3. Conduct an open house. Have students demonstrate proper use and adjustment of power equipment to visitors.
4. Design a bulletin board showing power equipment and accessories used in horticulture.
5. Bring in (or visit student's farm) equipment to recondition and adjust.

C. Constructing and maintaining horticultural plant support systems

Competencies - students will be able to:
1. Use concrete, masonry, carpentry and electrical skills necessary for horticultural construction and maintenance.
2. Explain several irrigation and sprinkling systems and how they may be constructed.
3. Operate and maintain heating, cooling, electrical, and mechanical control systems.
4. Operate and maintain CO_2 generators.
5. Use plumbing skills necessary for maintenance of the copper, steel and plastic pipes and fittings used in horticultural systems.
6. Maintain steaming and sterilizing equipment.

Learning activities:
1. Visit a greenhouse and have the maintenance man explain how he keeps the equipment in good operating condition.
2. Cooperate with the Ag-Mech. shop in developing some of the basic skills needed.

3. Construct a mist system and control for use in the school greenhouse over the propagation bench.
4. Build a plumbing board containing all the types of pipes, fittings and constructed joints which may be needed for use in a horticultural industry.
5. Develop a plan for efficient irrigation of each student's home garden or horticultural enterprise.

D. Safety

Competencies - students will be able to:
1. Explain the use and need for the inclined plane, pulley, wheels, lever and hydraulic action in helping to prevent personnel injury.
2. Handle and store dangerous pesticides and other control chemicals in a safe manner.
3. Safely operate large and small power equipment used in the area of horticulture.
4. Adhere to job safety regulations (e.g. when tree climbing).
5. Use fire extinguishers and explain where they are needed in various horticultural industries.
6. Administer first aid.

Learning activities:
1. Color code the greenhouse and shop to identify potentially hazardous areas.
2. Survey the school horticultural facilities and recommend safety committee whose responsibility it is to see that safety regulations are carried out.
3. Issue, upon satisfactory completion of testing, an operator's permit to each student indicating which types of equipment he or she is qualified to operate.
4. Demonstrate for local community organizations proper safety measures to be used when operating horticultural equipment.

Business Procedures

Problem Areas
- A. Establishing a horticultural business
- B. Business records
- C. Markets and marketing methods

Competencies and Learning Activities

A. Establishing a horticultural business

Competencies - students will be able to:
1. Identify the factors to be considered in selecting the best location to start a horticultural business.
2. Indicate the business laws affecting a newly established horticultural operation.
3. Determine the structures and operating equipment needed to successfully begin a new horticultural business.
4. Establish a format to be used in organizing the venture for most efficient operation.
5. Recognize the need for proper financing and list the sources available to a new horticultural business.

6. Suggest methods of recruiting and managing employees.
7. Recognize the trade organizations and government agencies available for his or her use.

Learning activities:
1. Given a specific location, develop a plan (to include structures, layout, markets, etc.) for starting one particular type of horticultural business.
2. Develop a bulletin board showing the factors to be considered in establishing a horticultural business.
3. Pick one type of horticultural business and construct a scale model of the entire layout (model may be placed in sandbox and constructed with art supplies.)
4. Visit a local business that is horticulturally oriented and have students ask owner or manager questions prepared in advance.
5. Invite a lawyer to speak to the class on laws affecting new business.

B. Business records

Competencies - students will be able to:
1. Recognize the importance of keeping well organized records.
2. Explain inventory records and how they would be used in a horticultural business.
3. Demonstrate the use of business records relative to a typical horticultural operation.
4. Indicate possible cash receipt and expense record procedures that could be utilized by a horticultural business owner.
5. Summarize methods of keeping production records for each major type of business (e.g. bedding plants, pot plants, etc.).
6. Design a form for keeping employee records that could be used in all types of horticultural businesses.
7. Explain the importance of accurate tax records and describe possible recording methods.

Learning activities:
1. Bring various items into the classroom and put a price tag on them. Students play the roles of customer and sales personnel. Have each student complete forms relating to receipts, credit, etc.
2. Develop a form for keeping employee records, have each student use the form to account for his or her actions during the day.
3. Visit a horticultural business, allow students to observe and participate in various business procedures.
4. Visit the Internal Revenue Service, have their personnel explain the importance of proper recordkeeping and summarize the agencies available to help new businesses.
5. Cooperate with local business, allow students to assist in the yearly inventory.

C. Markets and marketing methods:

Competencies - students will be able to:
1. Explain the types of market outlets (e.g. retail, mailorder, etc.)
2. Determine the importance of each market outlet to the overall production industry (which market do producers rely on most heavily ?).

3. Demonstrate various packing, labeling and marking techniques used with horticultural products.
4. Explain proper methods of shipping and delivering horticultural products.
5. Determine effect storage procedures have on product quality which in turn affects the markets.
6. Recognize the market possibilities in the local area for a given horticultural crop.
7. Explain how a market can be developed through proper advertising and promotion techniques.

Learning activities:

1. Visit a packing plant, allow students to participate in the actual handling and packing of the products.
2. Survey the community and determine the possibilities of marketing various types of horticultural products.
3. Contact an agricultural products broker and have him explain by phone the investment and marketing procedures. Then have students select a crop and chart its price fluctuations and make imaginary investments.
4. Draw up an advertising layout to be used in promoting a horticultural product.
5. Make a marketing game. Assign roles (retailer, packer, wholesaler, etc.) to each student and follow the movement of horticultural products through the various marketing phases.

Instructional Aids

1. Business forms, New England Business Service, Inc.
2. The Application of Selected Business Principles to Farming Program Record Keeping, Pennsylvania State University.
3. (See also Agricultural Supplies and Services)

Landscaping

Problem Areas:

- A. Planning a landscape
- B. Selecting plant materials
- C. Establishing ornamental plants
- D. Landscape construction
- E. Landscape maintenance

Competencies and Learning Activities

A. Planning a landscape

Competencies - students will be able to:

1. Select landscaping locations with regard to "on site" and "off site" factors (house, lot, surrounding properties, etc.).
2. Determine family needs and design an appropriate landscape plan for home grounds.
3. Distinguish between functional and aesthetic landscapes and explain how they can be combined.
4. Estimate the cost of various landscapes, from planning to completion.

5. Design landscapes showing alternative arrangements of public, private and service areas.
6. Develop basic skills in drawing and reading landscape blueprints.
7. Calculate the increase in value of various properties after a good landscaping plan has been implemented.

Learning activities:

1. Visit a newly established home landscape and have the designer discuss what is needed in a good landscape plan.
2. Interview the parents of a student, analyze their family needs and have the class create possible landscapes that would best fit the family's needs.
3. Divide the class into teams, place landscape blueprints symbols on cards, conduct a contest in which each team tries to identify the cards as they are flashed.
4. Collect pictures from various publications showing examples of public, private and service areas. Develop a display using these pictures.
5. Photograph the front of each student's home. Have each student reproduce the picture as a line drawing and design an appropriate landscape.
6. Create a landscape design for the school grounds.
7. Construct landscape models from designs drawn up by the individual students. Use construction materials such as cardboard, wood and styrofoam.

B. Selecting plant material

Competencies - students will be able to:

1. Identify many of the landscaping plants common to the local area.
2. Determine which plants may be planted in the local community according to hardiness.
3. Determine proper exposure areas (calm air, breezes, strong winds, etc.) for various landscaping plants.
4. Distinguish between deciduous and evergreen plants and determine where each can be used most effectively.
5. Explain the growth habits of plants likely to be used in a home landscape.
6. Select plants according to color variations as viewed throughout the growing season.
7. Classify plants into groups representing trees, shrubs, vines, ground covers, etc.
8. Select plants for home landscaping plan.

Learning activities:

1. Develop a list of primary and alternative plants to be used in home landscape design.
2. Develop a planting plan to be used for establishing plants as designated in their landscape design.
3. Develop a bulletin board showing hardiness zones and other factors affecting selection of landscape plant materials.
4. Visit several landscaped homes or parks and have students identify the plants used.

5. Have students design and establish a school arboretum, where plants can be labeled and maintained for class instruction.
6. Visit a student's home. Design a landscape and have students estimate the total cost of implementing the plan.
7. Visit a nursery and have students grade the stock according to quality.

C. Establishing ornamental plants

Competencies - students will be able to:
1. Excavate and transplant trees and shrubs into landscape schemes.
2. Perform special plant training procedures (topiary, espaliers).
3. Wrap or paint and stake newly established trees and shrubs to protect them from damage (sunburn, rabbits, etc.).
4. Successfully establish various landscape ground covers and classify them according to light requirements.
5. Explain the sequential order of flowering necessary to maintain color in a perennial flower garden and state when each should be planted.
6. Select and plant annuals that may be used to supplement a home landscape.

Learning activities:
1. Obtain a lot that is to be landscaped. Take soil tests and determine the soil modifications necessary before planting.
2. Visit a nursery and have the owner discuss the procedure followed in obtaining nursery stock. Fill out the forms necessary for ordering landscape plants.
3. Transplant several trees into the school landscape, or into the home landscapes of students.
4. Prune, wrap and stake newly established trees (may be done to the plants in learning activity three, or as a community service for the local people.)
5. Establish a perennial flower garden on the school grounds. Determine the type of plants to be used, planting procedures and maintenance requirements.

D. Landscape constructions

Competencies - students will be able to:
1. Identify and operate equipment used for various landscaping tasks.
2. Construct traffic area structures (drives, walks, steps, etc.) and explain the function of each.
3. Identify the types of structural materials (concrete, bricks, flagstone, etc.) that may be used in landscapes.
4. Create plans for different types of walks and fences and explain their construction.
5. Describe how pools and fountains may be worked into a landscape plan.
6. Design a patio that may be used in a home landscape.
7. Determine proper slope changes and grade a site to the proper contour.
8. Design and install various types ot drainage systems needed for specific landscapes.

Learning activities:

1. Visit one of the student's homes and have the class determine the contour of the land (using surveying equipment).
2. Develop problematic skill sheets (example - determine the rise and run of steps for different slopes) and give to students as a take home project.
3. Visit a construction site and allow students to observe and participate in various activities.
4. Construct and repair traffic structures (sidewalks) on the local school grounds.
5. Construct a patio area with structure and plantings on the school grounds to be used by the students.
6. Establish a community service unit that will construct and repair various landscape structures used in the community.

E. Landscape maintenance

Competencies - students will be able to:

1. Prune ornamental plants according to their individual needs.
2. Identify pests (insects, diseases, rabbits, weeds, etc.) which may affect landscape plants and recommend a possible preventative and/or control program.
3. Demonstrate the proper procedure for mowing lawns.
4. Prepare plants for winter.
5. Water, mulch, and fertilize various landscape plants and explain why each process is important.
6. Explain safety requirements that should be observed while maintaining a good landscape.

Learning activities:

1. Make each student responsible for maintaining one or two plants on the school grounds.
2. Visit each student's home and have him or her demonstrate proper maintenance on their landscapes.
3. Develop a landscape maintenance organization for maintaining community homes (may be used as a fund raising project).
4. Publish a newsletter to inform local citizens of seasonal landscape maintenance procedures.
5. Develop a demonstration plot showing the results of various improper mowing procedures.

Instructional Aids:

1. Principles of Landscaping, 27 slides, North Dakota Voc-Ag. Assoc.
2. Pruning Ornamental Shrubs, filmstrip, California State Polytechnic College.
3. Landscape Trees and Shrubs, 40 slides, Gallaway Gardens.
4. Landscaping the Home Grounds, slide series, Ohio Agricultural Education Curriculum Materials Service.
5. Landscaping--Do's and Don'ts, slidefilm 642, Voc-Ag. Service, University of Illinois.

EVALUATION

1. Set up a program with the student for developing his or her horticultural enterprise. Grade individuals according to progress made toward establishing an efficient operation.

2. Develop a problem relating to prices and sales of horticultural products; have students calculate proper percentages and discounts.

3. Bring in plants found in the local area, use them in a lab practical and have students classify them.

4. Develop a plant key that lists everything but plant's name, provide students the key and give them a weed to identify and find a specimen of the plant in question.

5. Grow or collect one variety of grass under different fertilizer deficiencies and environmental conditions, have students identify the problems and recommend renovation or control measures.

6. Establish a problem situation including location, grade and soil type of a given area; have students list the steps necessary for establishing and maintaining a lawn under the stated conditions.

7. Photograph various greenhouse structures and related equipment; have students identify them according to name, function and approximate cost.

8. Have each student demonstrate the procedures to be followed in planting and transplanting various horticultural greenhouse crops.

9. Give each student a line drawing of a house on an unlandscaped lot; have the students design a landscape using concepts covered in previous class periods.

10. Prepare a blueprint of the schoolgrounds with possible location (selected by) the instructor) for trees and shrubs. Give each student a copy of the blueprint and have him or her detect each location and mark it with a flag.

11. Rotate the responsibility of managing school enterprises (school garden, greenhouse, etc.) among the students and evaluate their proficiency.

12. Develop a set of cards listing various tasks relating to horticulture (spraying, pruning, etc.) and have students attach the cards to the type of equipment best suited to that job (equipment may be displayed in the shop or combine the test with a field trip to a local garden center or horticultural machinery supply).

13. Have each student calibrate a sprayer for a given application rate (may be used in conjunction with a written exam).

14. Conduct a judging contest, students will select and place various classes of fruit.

15. Bring in samples of diseased plants and several varieties of chemical control; have students match the chemicals with the disease and recommend methods of application.

16. Obtain several examples of vegetables; have students identify them, list where they originated, and how they were grown.

17. Design or obtain a student work book containing work sheets on vegetable production competencies, grade students on number of work sheets completed.

18. Ask questions of individual students at various times throughout the course.

19. Pre- and post-tests on competencies relating to each unit.

20. Determine the steps involved in a horticultural skill and have individual students perform the competencies with class members evaluating his or her progress.

21. Be aware of the attitudes and work habits of students as they participate in various class activities.

22. Design a check sheet to be given to employers for evaluation of students placed on work experience.

23. Develop a grading sheet on which a student can evaluate his or her own progress (this is also a good indication of the quality of course content and instruction).

24. Students write a paper concerning material from one unit to be evaluated by the instructor (evaluation may also be made by a resource person in the field being covered).

25. Assign each student a hobby project (developing home garden, landscaping lawn, etc.) and evaluate on the work accomplished.

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Chevron Chemical Company

2. ANNUALS FOR CUT FLOWERS, Potter
Florist Publishing Company

3. APPROVED PRACTICES IN FRUIT PRODUCTION
Scheer-Jurgenson
Interstate Printers & Publishers

4. ARRANGING FLOWERS IN VASES AND BOWLS
University of Illinois

5. HOME GARDENING
Meredith Corporation

6. BUYING BEDDING PLANTS
University of Illinois

7. SMALL ENGINE SERVICE MANUAL
Briggs and Stratten Corp.

8. A CHILD'S GARDEN
Chevron Chemical Company

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12 Modules
Ohio State University

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University of Illinois

11. 50 LABORATORY EXERCISES FOR VOC. HORT.
Hemp
Interstate Printers & Publishers

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Nelson
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McGraw Hill

17. GOLF TURF MANAGEMENT
Musser
McGraw Hill

18. HANDBOOK FOR VEGETABLE GROWERS
Knott
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Janik
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McCulloch Motor Company

21. LANDSCAPING
Department of Public Instruction
Indianapolis, Indiana

22. LANDSCAPING DO'S AND DON'TS
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Sunset Editorial Staff
Lane Book Company

26. MANAGEMENT PLANS FOR GREENHOUSES
George Ball Company

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Pinney
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University of the State of New York

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Greenhouse Management
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University of Illinois

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USDA

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University of Illinois

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Liosvold
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Penn State University

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Symonds
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College of Agriculture
Urbana, Illinois

48. SOILS
Yearbook of Agriculture
USDA

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University of Kentucky

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University of Georgia

51. THE NURSERY WORKER PART I & II
Ohio State University

52. TRANSPLANTING SHADE TREES
University of Illinois

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Dept. of Agricultural Education
Tucson, Arizona 85702

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Los Angeles, California 90052

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534 Mumford Hall
Urbana, Illinois 61804

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Lincoln, Nebraska 68503

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Albany, New York 12224

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New York, New York 10017

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New York, New York 10016

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New York, New York 10016

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New York, New York 10001

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Ardsley, New York 10502

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3 East 54th Street
New York, New York 10001

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Department of Public Instruction
Agricultural Education Section
Raleigh, North Carolina 27602

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100 Morrill Hall
North Dakota State University
Fargo, North Dakota 58102

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Curriculum Materials Service
2120 Fyffe Road
Columbus, Ohio 43210

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The Center for Vocational and Technical Education
1900 Kenny Road
Columbus, Ohio 43210

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College of Agriculture Experiment
Station
Department of Agriculture Education
University Park, Pennsylvania 16802

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Teaching Materials Center
Texas A & M University
College Station, Texas 77843

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Logan, Utah 84321

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Agribusiness and Natural
Resource Education

Curriculum Guide

AGRICULTURAL RESOURCES
AND CONSERVATION

A joint publication of:

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and

DEPARTMENT OF PUBLIC INSTRUCTION
Career Education Division
Grimes State Office Building
Des Moines, Iowa 50319

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Grimes State Office Building
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SOURCE OF CURRICULUM GUIDES

The following ten curriculum guides in agribusiness and natural resources are available as a set from the Department of Public Instruction:

Agribusiness and Natural Resource Education

Animal Science

Agronomic Science

Agricultural Mechanics

Farm Business Management

Agricultural Supplies and Services

Agricultural Products Processing and Distribution

Horticulture

Agricultural Resources and Conservation

Occupational Experience in Agriculture

Order from Information and Publications Services Section, Department of Public Instruction, Grimes State Office Building, Des Moines, Iowa 50319.

Price, $5.00 per set of ten curriculum guides listed above. Please send remittance with order.

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FOREWORD

This curriculum guide is one of ten developed for use by vocational and technical agribusiness instructors in planning instructional programs to meet the needs of their students. Elementary teachers and instructors in other subject matter areas at the secondary level may find the guide of value in introducing principles of career education in their instructional programs. Although much of the material is designed for use at the secondary or post-secondary levels, many of the competencies may be introduced at the awareness or exploratory levels of career education.

Instructors in multiple-man departments at the secondary level and in post-secondary schools may organize nine-week or semester courses around the units and problem areas outlined in this guide.

Appropriate competencies and learning activities have been provided for each problem area. The competencies listed are those determined in previous studies as needed by persons employed in natural resources and conservation. Instructional aids and references are listed for each unit.

A list of titles of occupations requiring competencies in natural resources and conservation has been included in the guide. It is assumed that only partial attainment of some competencies can be done at the elementary and secondary levels. The competencies may not be mastered until the student has completed additional preparation at the post-secondary, young or adult class, or collegiate levels. It is assumed that "hands on" and occupational experience will be provided with class and laboratory instruction at all levels.

Evaluation of the instruction in natural resources and conservation should be based largely upon attainment of the competencies listed in this guide, and on the application of them as students participate in occupational experience programs.

Allocations of units and of instructional time in the four-year sequence of courses at the secondary level are presented in the curriculum guide titled. Agribusiness and Natural Resource Education. Also presented are suggested activities involving natural resources and conservation for teachers at the kindergarten through sixth grade level, and suggested outlines of subject matter to be included in exploratory programs at the junior high school level.

Curriculum Guide, Natural Resources and Conservation was prepared by Jerry A. Biermann, Vocational Agriculture Instructor, Garnavillo, Iowa; and Dennis J. Lettow, Vocational Agriculture Instructor, Iowa Falls, Iowa (Committee Chairman).

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State Consultant Staff in Career Education - Emeron Dettmann, Gerald Lamers and Elwood Mabon.

ISU Teacher Education Staff - Dr. Harold Crawford, Dr. Bennie Byler, Richard Carter and Dr. Thomas Hoerner.

Vocational Agriculture Instructors - Garland M. Ashbacher, Tom Hensley, G. Leslie Johnson, Lewis Lauterbach, Dennis Lettow, James L. Patton, Thomas A. Silletto, Frederick A. VanLoh and Joe R. White.

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OCCUPATIONAL TITLES

Instructional programs based upon content in this guide will prepare individuals for job entry, will upgrade occupational skills, or will prepare learners for further occupational preparation.

Air Resource Management

Air Pollution Control Worker
Air Monitoring Technician
Smoke Tester
Air Analyst
Compliance Section Technician
Engineering Section Technician
Air Pollution Control Supervisor
Air Pollution Control Meterologist
Air Pollution Control Chemist
Air Pollution Control Engineer

Fish Management

Fish Hatchery Worker
Fish Farmer
Conservation Patrolman
Fish Culturist
Fisheries Scientist
Fish Hatchery Superintendent
Fisheries Technician
Fishery Biologist
Fishery Manager

Forest Resource Management

Tree Planter
Forestry Aide
Tree Farmer
Forest Technician
Wood Supervisor
Forest Nursery Technician
Forest Cruiser
Forest Warden
Forester
Forest Entomologist
Consulting Forester
Forest Examiner
Forest Supervisor
Forest Engineer
Forest Ecologist
Forest Ranger
Silviculturalist
Saw Mill Manager
Saw Mill Foreman
Saw Mill Worker
Forest Manager

Land Use Planning

Surveyor's Assistant-Rodman
Surveyor's Assistant-Chainman
Surveyor
City Planning Aide
Urban Planning Technician
Zoning Inspector
Zoning Technician
Chief Planning Officer
City Planning Engineer
Urban Planner
Regional Planner
Land Use Planner
Architectural Engineer
Mining Area Restoration Worker
Mining Area Restoration Technician
Open Pit Mine Conservation Inspector
Mineralogist
Geologist

Outdoor Recreation Planning

Grounds Keeper
Parks Caretaker
Parks Worker
Recreation Farm Manager
Dude Ranch Manager
Hunting and Fishing Guide
Recreational Development Technician
Fish and Game Club Manager
Ski Patrolman
Winter Sports Manager
Guest Farm Manager
Parks Foreman
Parks Naturalist
Parks Superintendent
Parks Ranger
Campground Caretaker
Camp Counselor

Soil Conservation

Soil Conservation Aide
Soil Conservation Technician
Engineering Technician
Soil Scientist
Soil Fertility Expert

OCCUPATIONAL TITLES (Cont.)

Soil Conservation (Cont.)

Soil Bacteriologist
Agrogeologist (Soil Mapper or Surveyor)
Soil Conservationist
Drainage Design Coordinator
ASCS Supervisor
ASCS Manager

Water Resource Management

Watershed Manager
Water Filter Cleaner
Wastewater Disposal Worker
Basin Operator
Watershed Tender
Public Health Engineering Aide
Sanitarian Aide
Stream Sanitation Technician
Sanitarian
Limnologist
Water and Waste Treatment Plant Manager
Water Quality Chemist
Public Health Bacteriologist
Industrial Wastes Inspector
Hydrologist
Water Resources Investigator
Water Well Inspector
Water Treatment Plant Technician
Wastewater Treatment Plant Technician
Water Economist

Wildlife Management

Game Farm Worker
Gamekeeper
Wildlife Conservation Officer
Animal Shelter Keeper
Wildlife Technician
Game Warden
Animal Shelter Manager
Game Propagator
Wildlife Biologist
Wildlife Specialist
Wildlife Administrator
Waterfowl Specialist

AGRICULTURAL RESOURCES AND CONSERVATION

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GENERAL OBJECTIVES

Natural resources are those naturally occurring phases of nature having human utility value. Students completing instruction in conservation of agricultural resources will strengthen their awareness of environmental problems, and develop their interests in and abilities to:

1. Analyze their future employment opportunities in agricultural resources.
2. Identify and solve environmental problems.
3. Apply conservation skills in meeting agricultural needs.

UNITS

Agricultural Resource Opportunities
Air Resource Management
Fish Management
Forest Resource Management
Land Use Planning
Outdoor Recreation Planning
Soil Conservation
Water Resource Management
Wildlife Management

Agricultural Resource Opportunities

Problem Areas

- A. Occupational opportunities in resource management
- B. Identification of conservation needs
- C. Classification of resources
- D. Involvement in environmental improvement

Competencies and Learning Activities

A. Occupational opportunities in resource management

Competencies - students will be able to:

1. Locate at least six employers of agricultural resource workers.
2. Determine eight agricultural resource areas of employment.
3. Describe briefly characteristics of two occupations in each of the eight agricultural resource areas.
4. Recognize employment opportunities in the various agricultural resource occupations.

Learning activities:

1. Prepare a poster illustrating the activities of someone working in a conservation occupation.
2. Survey the community listing occupations involving conservation.
3. Assign student teams to list occupations in various agricultural resources, one team for each resource area, and report back to the class. (Include description and employment prospects)
4. Students invite the county park or city park officer to speak to the class.

B. Identification of conservation needs

Competencies - students will be able to:
1. Identify problems involved in each resource area.
2. Organize basic solutions to conservation problems.

Learning activities:
1. Discuss and define terms used in the study of conservation of agricultural resources.
2. Take a trip around the school district and list all possible conservation problems observed by the students.
3. Take a trip around the school district and have students list evidences of conservation practices.
4. Students tape interviews with community leaders seeking opinions concerning our community's major conservation problems.

C. Classification of resources

Competencies - students will be able to:
1. Identify and classify the various resources by natural, human and cultural resources.
2. Define the following terms commonly used in resource conservation: biomes, communities, climax communities, food chains, consumers, producers, predators and succession.
3. Identify and classify resources by renewable and nonrenewable resources.

Learning activities:
1. Students bring to class examples of renewable and nonrenewable resources and discuss each.
2. Students lead class discussion of natural, human and cultural resources.
3. Students establish area introducing native prairie grasses. Take pictures and record progress.
4. Students make transect study of native prairie area by laying out randomly selected 12" x 12" rectangle and counting all the different plant species in that area. (Record this information and keep these records from year to year)
5. Class members use posters, slides and information to define terms in natural resources.

D. Involvement in environmental improvement

Competencies - students will be able to:
1. Identify potential class action projects.
2. Plan productive enterprises, improvement programs and supplementary practices involving agricultural resources.

Learning activities:
1. Each student list and describe three productive enterprises in the community in agricultural resources.
2. Students compile a list and plan a tour of locations of improvement programs involving agricultural resources.
3. Students compile a list and plan record keeping of agricultural resource supplementary practices.

5. Students select panel members and conduct questioning session regarding environmental issues.

Instructional Aids

1. Careers in Natural Resources, California Polytechnic State University, filmstrip.
2. The E.Q. Index, the National Wildlife Federation, filmstrip.
3. Springbrook Conservation Education Camp, Guthrie Center, a two-day camp.
4. Problems of Conservation: Our Natural Resources, ISU Film Library, 16 mm. film.
5. Department of Environmental Quality, Lucas State Office Building, class speaker.
6. Ecology and the Agricultural Environment, California Polytechnic State University, filmstrip with record.
7. "Ecological Factors." J. Weston Walch, Publisher, Poster Set.
8. "Ecological Communities and Ecosystems." J. Weston Walch, Publisher, Poster Set.

Air Resource Management

Problem Areas

- A. Maintaining air quality
- B. Sampling and monitoring of air
- C. Controlling odors
- D. Controlling noise
- E. Weather interpretation

Competencies and Learning Activities

A. Maintaining air quality

Competencies - students will be able to:

1. Identify five sources of air pollutants and describe their effects on the environment.
2. Compile a listing of the air pollutants.
3. Discuss the harmful effects of air pollutants on plant and animal life.
4. Distinguish between harmful and unharmful air pollutants on plant and animal life.
5. Explain the laws and regulations governing air pollution.
6. Identify and describe agricultural contributions to air pollution.
7. Describe three natural ways to control air pollution.
8. Identify the various characteristics of air as it exists without man's contamination.
9. Distinguish between the naturally occurring and man made pollutants in our environment.
10. Select the best method to control air pollution given a particular problem.
11. Identify some of the properties of air pollutants.
12. Check a PCV valve to determine if it is functioning.

Learning activities:

1. Survey the local community and list the possible sources of air pollution in a twenty mile radius.
2. Take a field trip to industry to observe pollution control devices in action.

3. Visit a garage and have a mechanic demonstrate the functions of emission control devices on vehicles.
4. Conduct experiments using a vacuum cleaner and filter paper to determine air pollution in different areas of the community.
5. Students conduct interviews discussing air pollution and its effects on business.

B. Sampling and monitoring of air

Competencies - students will be able to:
1. Formulate three reasons for controlling air pollution.
2. Take a sample of air to check pollution.
3. Properly select air sampling sites.
4. Identify and explain two methods of sampling particulate matter.

Learning activities:
1. Visit local plants to see what is being done in controlling or monitoring air pollution.
2. Investigate the reasoning behind the selection of sampling sites through a written report.
3. Compile the results of air sampling surveys taken by students and observe changes over time taking place.
4. Conduct a survey taking samples of air from various locations using the same procedure of a vacuum cleaner and filter paper to determine where the pollution is the heaviest. Record data from microscope observations, magnifying glass and weight increase.
5. Experiment with two engines, using filter paper to check emissions and make comparisons. (Use a new and a worn engine).
6. Measure carbon monoxide in school shop, home garages, and commercial garages using measuring device available from power companies and commercial garages.

C. Controlling odors

Competencies - students will be able to:
1. Recognize the potential problems causing odor pollution.
2. Identify and explain the methods used in eliminating and controlling odors.

Learning activities:
1. Field trips to observe odor pollution control procedures.
2. Conduct a survey of the community and list the major sources of odor pollution.
3. Field trips to observe odor free lagoons and pits.
4. Students interview various businesses and individuals determining if the community has an odor problem.

D. Controlling Noise

Competencies - students will be able to:
1. Identify the effects of noise pollution.
2. Identify the sources of potentially hazardous noise pollution.
3. Describe the different solutions to the problem of noise pollution.
4. Explain the procedures used in measuring noise pollution.

Learning Activities:

1. Students make comparisons of the noise from different types of machinery using a tape recorder.
2. Survey the community on their solutions to noise pollution.
3. Invite county hearing specialist to conduct student hearing tests using an audiometer.
4. Conduct experiments to compare tractor noise emissions with various tractor cabs, types of earplugs and earphones, and with types of tractor mufflers.
5. Conduct experiments using various degrees of noise and live animals.
6. Student interviews concerning noise pollution problems and controls in the area.

E. Weather interpretation

Competencies - students will be able to:

1. Identify and describe the causes and effects of wind.
2. Recognize conditions for good and/or poor weather.
3. Find and interpret sources of weather information.
4. Distinguish between modern weather forecasting and weather lore.
5. Recognize various cloud formations and the possible weather problems related.
6. Read a barometer and explain the functions of the instrument.
7. Distinguish between high and low fronts.
8. Interpret the procedures used in the atmosphere when cleaning itself.

Learning activities:

1. Student groups make daily readings for one week or more. (Graph this information: wind direction and velocity, rainfall, temperature, humidity, etc.).
2. Field trip to observe a weather station in operation.
3. Interview persons asking for their ways in forecasting weather. (Determine fact from fiction).
4. Students conduct experiments on weather in the book Your Environment.
5. Have students construct and operate a local weather station.

Instructional Aids

1. Weatherman of T.V. station.
2. Problems in Conservation-Air - film. ISU Film Library.
3. Tuberculosis and Respiratory Disease Association representative.
4. County Sanitarian.
5. County Attorney.
6. Local doctor.
7. Cloud Chart. Science Associates.
8. Air Pollution - film. ISU.
9. Ecology and Agriculture - filmstrip. California Polytechnic State University.
10. Our Air - filmstrip. Coronet Instructional Materials.
11. Air Pollution: Take a Deep Deadly Breath - film. National Medical Audiovisual Center.
12. Clean the Air - film. American Petroleum Institute.
13. Toward a Cleaner Air - film. Associated Films, Inc.

Fish Management

Problem Areas:

A. Selection and identification of game and nongame fish
B. Establishing a fish pond
C. Management of a stream, lake or pond
D. Laws and regulations of fish resources
E. Equipment used in recreational fishing

Competencies and Learning Activities

A. Selection and identification of game and nongame fish

Competencies - students will be able to:

1. Identify Iowa species of game and nongame fish.
2. Classify fish as to gamefish, panfish, baitfish or trashfish.
3. Recommend varieties of fish to fit habitat provided.

Learning activities:

1. Stock an aquarium with tropical fish and baitfish.
2. Have students collect pictures of important game fish and baitfish in the area.
3. Visit fish ponds or hatcheries in the area and talk with owners about species, problems, costs and stocking procedures.
4. With the aid of a conservation officer, use a "shocker" to stun fish in a pond and identify the species.

B. Establishing a fish pond

Competencies - students will be able to:

1. Select a site considering depth, size, and water source.
2. Draw a cross-section of a dam.
3. Select vegetation to be seeded around pond and on dam to control erosion.
4. Estimate costs of farm pond construction.

Learning activities:

1. Draw to scale blueprints of pond designs and arrangements.
2. Visit existing ponds and have students compile a list of approved practices in establishing a farm pond. Ask owner about construction costs.
3. Have students stake out proposed pond area and average depth using surveyors level. From this, estimate pond area and capacity.

C. Management of a stream, lake or pond

Competencies - students will be able to:

1. Determine source of water.
2. Evaluate water quality considering pH, hardness, oxygen concentration, weeds, temperature, muddiness and depth.
3. Purchase fish species best suited to a given water environment.
4. Figure stocking populations.
5. Evaluate availability of natural fish foods.
6. Control undesirable fish.
7. Control weeds using chemical and biological methods.
8. Control algae accumulations.

9. Fertilize properly to grow more fish.
10. Control size of fish and measure production.

Learning activities:

1. Visit a farm pond and have students evaluate the water considering pH, hardness, oxygen concentration, weeds, temperature, muddiness and depth.
2. Have students make stocking recommendations for a farm if it were theirs to manage. Consider species and stocking rates.
3. Have a student or ask the pond owner to weigh all fish taken from his pond over a one-year period.
4. Have a student give a report as to why dumping fertilizer in a pond is an important management practice. Include recommendations and a microscope display of microscopic plants that color the water.
5. Have students set up a management service for area farm ponds and apply toward an FFA proficiency award.

D. Laws and regulations of fish resources

Competencies - students will be able to:

1. Interpret laws regulating inland lakes and streams.
2. Interpret laws regulating private waters.
3. Secure information concerning fishing regulations.

Learning activities:

1. Students tape an interview with enforcement officer of Iowa Conservation Commission regarding fishing regulations.
2. Have student demonstrate legal and illegal fishing equipment to class.

E. Equipment used in recreational fishing

Competencies - students will be able to:

1. Identify types of natural bait used and conditions for using each.
2. Identify artificial types of bait and conditions for using each.
3. Identify pole and line, fly casting, bait casting, and spin casting equipment.
4. Select nets and traps for recreational use.

Learning activities:

1. Form committees to make study of types of fishing tackle according to their interest and bring in examples of each, giving reasons of preference and comparative expense.
2. Have students encourage physical education instructor to include bait casting as part of curriculum.
3. Have student prepare a display of various types of artificial lures.

Instructional Aids

1. "Trout, U.S.A.," 16 mm. film; National Association of Conservation Districts; Environmental Film Service, League City, Texas.
2. Kenneth Kakec, Superintendent of Enforcement, Iowa Conservation Commission.

3. Local fishing equipment salesman.
4. County conservation officer.
5. Water testing equipment from city sewage plant; use Hach Chemical kit or state hygenic laboratory.
6. Farm ponds in the school district.
7. Soil Conservation Service county director.
8. "Fish Resources," slides; J. Weston Walsh.
9. "Walleye, Northern, Angels and Anglers" - film. Madison Department of Natural Resources.
10. "Better Fishing" - film. Madison Department of Natural Resources.
11. Dr. Robert Moorman, ISU Extension Wildlifer.

Forest Resource Management

Problem Areas

A. Utilizing benefits of forest resources
B. Selection and identification of trees
C. Planting seedlings
D. Managing farm forests
E. Measuring and marketing trees and forest products
F. Planning groves and windbreaks
G. Producing Christmas trees
H. Preventing fire losses.
I. Controlling diseases and parasites (See Horticulture Guide, Arboriculture Unit)

Competencies and Learning Activities

A. Utilizing benefits of forest resources

Competencies - students will be able to:

1. Recognize and name forest products.
2. Identify benefits of forest resources to land, human and and economic requirements.
3. Explain use of forests for recreational areas (See Outdoor Recreation Unit).
4. Develop a plan for the use of Iowa farm forests.
5. Plan forests for livestock shelter (See Soil Conservation Unit).

Learning activities:

1. Make a list of the industries that depend on wood.
2. On a visit to a wood-products distributor, list new and unique uses of wood.
3. Make a comparison of cost of construction of materials comparing wood products with other substitute materials.
4. Make a list of the benefits of a forest not including harvesting of wood products.
5. On a field trip observe the runoff occurring in forested areas and in open areas without forest cover.
6. Interview owners of local timberlands as to their uses and intentions for using the land.
7. Have students interview a sawmill operator and ask about his products.

B. Selection and identification of trees

Competencies - students will be able to:

1. Identify by common name tree species native to Iowa farms.
2. Identify the silvic considerations for each tree species identified.
3. Identify the various uses of each tree identified.
4. Use keys to tree identification to properly identify species.
5. Prescribe the proper tree species for planting on a given site based upon correct analysis of site conditions and use goals.

Learning activities:

1. Have students prepare a model of a tree using a small real tree and label each of the following: taproot, lateral roots, root hair, trunk, outer bark, inner bark, cambium, sapwood, heartwood, branches, crown, leaves, bud, twigs, flowers, fruit, and seed.
2. Students cut and dissect several different species of trees and show the differences in heartwood, sapwood, and cambium.
3. On a field trip identify the different tree species present in an oak-hickory community, maple-basswood community, and a cottonwood-willow community.
4. Identify trees in a marked forest area or plot.
5. Members of the class set up a tree identification contest for members of the FFA.
6. Students draw a grid plotting growing conditions against species of trees. Inventory a site and from the grid select the tree species most adaptable.
7. Develop an outdoor classroom with as many different species as possible.

C. Planting seedlings

Competencies - students will be able to:

1. Select good sources of seedlings to purchase.
2. Determine age of stock best to plant.
3. Prune roots.
4. Use various methods of "setting in."
5. Select types, methods and amounts of fertilizer at planting time.
6. Demonstrate the use of tools used at planting time.
7. Determine plant spacing for maximum growth.
8. Employ the "heeling in" process.

Learning activities:

1. Plant seedlings of school owned land or have students use this as a home improvement enterprise. Establishing a farm forest may be a productive enterprise.
2. Students develop a jack pine wheel to demonstrate effects of over population. Follow plans of a population wheel using only jack pine trees.
3. Survey the community for sources of nursery stock and compare tree varieties available, tree conditions and costs.
4. Collect pine seed from local trees. Plant them in seed flats. When ready to plant, make observation of the roots and contrast to wildling seedlings of similar age.

5. Have students prepare a bulletin board on how to plant a tree. Show cross-section of hole with root placement.

D. Managing farm forests

Competencies - students will be able to:

1. Properly fertilize trees.
2. Weed a stand of trees using different mechanical and chemical means.
3. Thin a stand of trees using the four methods.
4. Prune trees using different methods of pruning.
5. Equip a fire box for fire prevention.
6. Recognize needs for reforestation and methods of reforestation.
7. Prevent animal damage to farm forests.

Learning activities:

1. Students can fertilize trees on school grounds.
2. Set up a fertilizer demonstration plot on student farm or school grounds. Results should be evident within one year.
3. Have students divided into committees, go to a timber area, and mark trees that should be removed in a given area. Students must label tree with reason for removal: fire scar, dead, forked, crooked, "wolf tree," or poor species.
4. FFA chapter provide a tree pruning service to persons in the community.
5. Students build and equip fire boxes to be placed at home or on public timber.
6. Observe effects of pruning of trees in a farmer's timber or by a previous class upon growth and health of remaining crop trees.
7. In a stand of young coniferous trees, lay out several three square-rod plots. Decide how many trees should be pruned on the average per square-rod plot. Multiply this figure by 160 to get an estimate of how many trees should be pruned per acre.
8. Encourage student to set up a tree pruning service as an occupational experience program.
9. On a field trip have students identify types of animal damage and how to prevent it.

E. Measuring and marketing trees and forest products

Competencies - students will be able to:

1. Estimate the volume of standing timber on a given tract of land.
2. Determine the volume of felled trees.
3. Convert from cords to tonnage or weight.
4. Locate sawmills and veneer mills nearest their home farm.
5. Convert an ordinary farm truck to use for hauling logs.
6. Determine when trees may be harvested.
7. Decide whether to sell timber standing, felled, or delivered to the mill.
8. Take bids from timber buyers.
9. Write a timber sale notice.
10. Prepare home forest products for home use.

Learning activities:

1. Invite Soil Conservation Service director or district forester to aid students in boring trees to age them.

2. Make a cruising stick and tape in the shop.
3. Measure several trees in the immediate area of the school and estimate the volume of each tree using volume tables.
4. Investigate the local prices of the forest products being marketed in your community.
5. Obtain the specifications from a local buyer for pulpwood, sawlogs, crossties, and poles.
6. Prepare a sales contract for sales by the lump and unit method.
7. Prepare a list of some uses for ten of the forest trees found in your community.
8. Peel a freshly cut post. Weigh it. Remove the bark and weigh it once more. Allow the post to dry, making two-day weight observations until it reaches about 30% moisture content. Place in a penta solution for treatment, weighing at two-day intervals to record absorption. At the conclusion of the treatment make the final weight.
9. Students figure sale value of a standing timber. Check their work by buyer's bid.
10. Students fill out an FFA Proficiency Award application in the area of forestry.
11. Have students video-tape activities of a saw-mill with the help of the instructor.

F. Planning groves and windbreaks

Competencies - students will be able to:
1. Determine proper species for planting.
2. Decide the number of rows to be used.
3. Assess the proper spacing of the trees.
4. Plant stock properly. (See problem area "planting seedlings" in this unit).
5. Care for the groves and windbreaks after planting.

Learning activities:
1. Draw a windbreak in the Vo-Ag/FFA record book on the home farm map.
2. Draw a diagram to scale showing numbers of rows, varieties and proper spacing of a windbreak for the home farm or school.
3. Have students prepare a list of management practices to accompany their diagram. Include: herbicides, cultivation tips, mulching, and fertilizing.

G. Producing Christmas trees

Competencies - students will be able to:
1. Assess income potential of land use for Christmas trees.
2. Select land site most beneficial to Christmas tree production.
3. Recommend spacings for different species.
4. Select species for planting.
5. Plant trees by using a tree planting machine.
6. Develop a rotational pattern for continuous production.
7. Shear trees as recommended.
8. Harvest and store trees.
9. Tag, sort and sell trees.

Learning activities:

1. Outline a system of planting trees that will insure continuous production.
2. Develop an FFA Chapter Christmas tree plot and make trees available for sale on a limited basis to chapter members and faculty.
3. Decorate a Christmas tree in the agriculture room with the decorations showing forest management techniques.
4. Student use farm land space to establish Christmas trees for occupational experience program.

H. Preventing fire losses

Competencies - students will be able to:

1. Demonstrate the use of fire fighting equipment.
2. Prepare publicity showing how people can prevent timber, forest and grass fires.
3. Employ suppression measures to fires.
4. Compute fire danger index.

Learning activities:

1. From the weather station set-up in the "Air Resource Management" unit, compute the fire danger index and make information available to the local radio station.
2. Ask the local fire chief to discuss problems of fighting grass and timber fires.
3. Build fire boxes to be provided as a service to local and state parks. Use as FFA Building Our American Communities activity.
4. FFA members present a radio program or newspaper article at Christmas time on keeping Christmas trees safe.

Instructional aids

1. District forester.
2. Iowa State University extension forester.
3. Local fire chief.
4. Nursery stock salesman.
5. Sawmill operators (see Directory of Sawmills and Veneer Mills of Iowa, ISU Extension Service).
6. Local Christmas tree producers (see "Iowa Christmas Tree Producers", ISU Extension Service).
7. "How a Tree Grows," USDA, Chart, FS-8.
8. "What We Get from Forest Lands," USDA, Chart, FS-27.
9. "What We Get from Trees," USDA, Chart, M-5293.
10. "Some Steps in Woodlot Management," slides, C 1.2 Cornell University.
11. "Conserving Our Forests Today," film - Madison Department of Natural Resources.
12. "Farming Woodlands," film - Madison Department of Natural Resources.
13. "Forests," film - Madison Bureau of Audio Visual Instruction.
14. "Chain Saw Safety," film - American Pulpwood Association.
15. "The Forest," film - John Hall Film Service.
16. "Of Rabbits and Trees," ISU slides, S1062.
17. "Trees of America," ISU slides, S0323.
18. Pruning saws, tree markers, brush axes, tree or branch shear, brush axe.

19. "Using Our Forests Wisely," filmstrip, McGraw-Hill.
20. Forest Service Films, USDA, FS-31.
21. "Knock on Wood," National Particleboard Association.

Land Use Planning

Problem Areas
- A. Planning and zoning
- B. Land measurement and surveys
- C. Mineral resources
- D. Solid waste disposal
- E. Livestock waste disposal
- F. Selecting recreational sites

Competencies and Learning Activities

A. Planning and zoning

Competencies - students will be able to:
1. Determine the effects of zoning on their supervised farming programs on the farm and in the city limits.
2. Read and interpret land use maps and utilize this information in resource planning.
3. Outline the steps in the planning process involving urban information in resource planning.
4. Using zoning laws and a map of the town, determine where agribusinesses can be located considering the transportation services, land use, public services and economic base.
5. Recognize and describe the functions of a comprehensive planning and zoning ordinance.
6. Formulate the section of agricultural land use in a comprehensive plan for community development.
7. Determine whether parents must register their feedlot operations with the Department of Environmental Quality.
8. Complete an application form to register the home feeding operation.
9. Recognize the factors involved in land use planning of an individual or agribusiness. (Capital improvements, easements, subdivision ordinance, building code, and sanitary conditions.)

Learning activities:
1. Secure a map of a local township and plot all parcels of land indicating present usage, resources and problem areas.
2. Using a copy of a soil survey map, plot soil limitations for residential, agribusiness, road, farm and recreational areas.
3. Using copies of other zoning ordinances from nearby townships or communities, compare the major differences.
4. Interview zoning commission officials asking for their reasons or opinions of county and city zoning and the problem areas of the community.
5. Choosing one problem area within a comprehensive plan, write a proposed zoning ordinance for solving the problem. Using other ordinances as a guide. (Example: Agricultural problems in urban development - curbed farm operations.)
6. Make a sketch of a well-planned subdivision for rural-urban development and include regulations.

7. Fill out an application form for feedlot registration and sketch the operation on an aerial photograph.
8. Survey the community identifying the feeding operations that should be registered.
9. Rate the various agribusinesses in the community. Use the factors involved in land use planning.

B. Land measurement and survey

Competencies - students will be able to:

1. Obtain distance by pacing on a level field within a predetermined variation.
2. Obtain distance with a steel tape on sloping terrain (over 2%) using a plumb bob.
3. Write legal descriptions of a selected plot of land.
4. Determine field area, in acres, of specific plots of land. (Rectangle, any triangle, curved boundaries, and trapezoids).
5. Convert the various units of measurement from English to metric systems and also interchange measurements within each system.

Learning activities:

1. Conduct an accuracy comparison by measuring the perimeter of the school grounds by pacing, steel taping, chaining and the use of the measuring wheel.
2. Student determine the acres in his supervised farming crop program given the length of rows.
3. Help the supervisor measure the acreages for the Master Corn and Soybean Yield Contest.
4. Locate a plot of land given a legal description.
5. Dividing the class into two groups, conduct a contest having each write numerous legal descriptions, changing with the other group and then allot time to find.

C. Mineral resources

Competencies - students will be able to:

1. Explain the importance of Iowa's mineral resources to the agricultural economy.
2. Describe the effects of surface mining on land usage.
3. Identify the mineral resources affecting agricultural income and land in Iowa.
4. Explain the procedures used in mine reclamation.

Learning activities:

1. Determine what minerals are included in Iowa's resources and the number of workers employed in mineral extraction and related agricultural industries.
2. Take a field trip to a mining operation and observe conservation practices used.
3. Interview miners with a tape recorder discussing conservation practices and usage of mined-out areas as to returning to original status.
4. Student interviews of gravel pit operators in community discussing the problems involved in location, conservation practices, and economics as related to agriculture.

5. Prepare a bulletin board on the basic steps in reclamation of mining areas.
6. Inventory a mined area and propose a future use for the land.

D. Solid waste disposal

Competencies - students will be able to:

1. Differentiate between the five methods of waste disposal.
2. Locate the landfill operations in the county and other waste disposal systems in the county in use.
3. Describe the limitations of the system of disposal available.
4. Dispose of solid wastes from agriculture through interpretation of laws and regulations.
5. Interpret the reasoning behind the location of landfill operations in the county.
6. Identify the solid waste problems resulting from our society.

Learning activities:

1. Survey the communities in the county to determine which method or methods of solid waste disposal are being used.
2. Interview farmers, using a tape recorder, asking their opinions of the methods of solid waste disposal in their area.
3. Students prepare bulletin boards or displays on the methods of refuse disposal.
4. Establish a collection center for recycling of refuse as an FFA community service project.
5. Survey the community and locate the various solid waste disposal systems.
6. Interview the managers of various plants for the disposal of wastes and discuss the procedures and their limitations.
7. From soil maps, locate the various landfill plants and potential areas in the surrounding community.
8. Develop an off-road cleanup campaign as an FFA community service project.

E. Livestock waste disposal (See Agricultural Mechanics Guide)

F. Selecting recreational sites (See Agricultural Resources and Conservation Guide)

Instructional Aids

1. County supervisors.
2. The Trouble with Trash - film. Modern Talking Picture Service.
3. The Third Pollution - film. Department of Natural Resources, Madison, Wisconsin.
4. Sanitary landfill manager.
5. Ed Ricks, Eagle Grove FFA Chapter. Recycling.
6. The Greatest Good - film. Colorado Mining Association.
7. Code inspector, township planner or regional planner.
8. Field trips to observe placement of feedlots.
9. Department of Environmental Quality Personnel.
10. Extension Personnel, Dr. Burl Parks, Professor of Landscape Architecture.
11. Field trip to sanitary landfill or another type of disposal plant.
12. Civil Engineering Department, ISU.

13. Solid Wastes - filmstrip. Coronet.
14. Teacher's Guide to Recycling an Ecology Study - filmstrip. The Aluminum Association.
15. Minerals and Metals - slides. J. Weston Walch.
16. Soil Conservation Service Personnel, reclamation.

Outdoor Recreation Planning

Problem Areas:

A. Recognizing demand by public for outdoor recreation activities
B. Developing a safety program for a recreational facility
C. Recognizing local, state and federal laws regulating a recreational enterprise
D. Financing
E. Advertising and promoting recreation areas
F. Maintaining and operating the enterprise
G. Selecting a site
H. Laying out a campground
I. Planning hiking and riding trails
J. Planning and operating a hunting preserve
K. Planning sled and snowmobile areas

Competencies and Learning Activities

A. Recognizing demand by public for outdoor recreation activities

Competencies - students will be able to:

1. Compile a list of outdoor recreation activities for the public.
2. Identify the different types of natural resource recreational areas.
3. Assign kinds of services and facilities needed by recreational areas.
4. Project the needs for Iowa people in outdoor recreation for 1980 and 1985.
5. Recognize income potential of farm as a possible guest farm.

Learning activities:

1. Student interview classmates, community leaders, and others randomly selected to identify their participation in outdoor recreational activities and survey community needs.
*2. Have students divided into groups and each group visit recreational facilities in the school district and report back to class. Include facility name, purpose, recreation activities available.
3. Design a brochure listing recreational facilities in the school district and identify the services provided by each.
4. Using "Outdoor Recreation in Iowa" pamphlets have the students make projection of participation rates for 1980 and 1985.

B. Developing a safety program for a recreational facility

Competencies - students will be able to:

1. Predict possible hazards of an outdoor recreational facility.
2. Identify the causes of potential hazards.
3. Recommend changes to eliminate possible hazards.

4. Have students design a rating scale for recreational safety and rate facilities in the school district, later recommending safety improvements. Ideas include traffic patterns, poisonous plants, hazardous trees, sanitation, terrain features.
5. Have students present demonstrations on boating; hunting; swimming; ice, snow or snowmobile; hiking; fire; and riding safety. Present these demonstrations to service clubs.

C. Recognizing local, state and federal laws regulating a recreational enterprise

Competencies - students will be able to:

1. Identify laws which regulate public access.
2. Secure insurance protection for the enterprise: liability, accident, compensation, collision, theft, fire.
3. Interpret OSHA implications of outdoor recreational facilities.

Learning activities:

1. Interview managers of public facilities and obtain information concerning regulations affecting his facility.
2. Secure a comprehensive liability insurance policy and highlight those areas providing liability protection to outdoor recreational activities.
3. Secure a copy of OSHA regulations and identify those regulations which affect a facility selected by the instructor in the school district.

D. Financing

Competencies - students will be able to:

1. Secure sources of financial aid available to private individuals for recreational facility development.
2. Recommend sources of matching funds for municipal governments.
3. Establish sources of supplemental income.
4. Determine property, income and sales tax liability.
5. Keep records pertaining to their recreational enterprise.

Learning activities:

1. Students report to class the financial assistance available for recreational development from Farmers' Home Administration, Production Credit Association, commercial banks, Small Business Administration, and the Agricultural Stabilization and Conservation Service.
2. Develop a plan using information from the Bureau of Outdoor Recreation that might be presented to the local city government showing how matching funds could provide a recreational facility.
3. Develop plans for productive enterprises involving sources of supplemental income from bait and tackle sales, guide services, equipment rentals, lessons and concessions.
4. Use agriculture program record book for record keeping.

E. Advertising and promoting recreation areas

Competencies - students will be able to:

1. Utilize modern advertising methods to promote a recreational facility.

2. Determine most effective methods of promoting recreational facilities.

Learning activities:

1. For one week ask students to keep a list of all methods used to encourage the use of recreational facilities.
2. Prepare a radio program or one minute commercial encouraging the public to use a certain recreational facility.
3. Have students make signs in agricultural mechanics laboratory for a private or public recreational facility.
4. Prepare a brochure for public recreational facilities in the school district.

F. Maintaining and operating the enterprise

Competencies - students will be able to:

1. Repair and provide upkeep of recreational facilities.
2. Locate water supply structures on a camping facility.
3. Provide electric service to a camping area.
4. Control vegetation in a recreational facility.
5. Control insects in camping areas.
6. Determine traffic patterns and organize flow of public.

Learning activities:

1. Locate a shelter house, identify upkeep needs and provide repair as class service project or occupational experience program.
2. Design a water fountain for public area.
3. Students list herbicides and classify as to soil sterilant, grass killer and broadleaf weed killer.
4. Obtain a list of insecticides and have students list pros and cons for use in a recreational facility.
5. Draw a map of a recreational facility, have students walk to various areas and indicate on the map where roads and walking trails should be located.
6. Take slides of damage to facilities in parks and recreation areas and ask students to identify ways of preventing these problems.

G. Selecting a site

Competencies - students will be able to:

1. Select a site for a summer recreation area considering travel time, proximity to demand, type of demand, and state and local laws.
2. Recognize internal factors in selecting a site including natural attractions, ease of access, water supply and vegetation.

Learning activities:

1. Evaluate existing campground based on physical and socioeconomic factors.
2. Obtain a soil survey map and land capability map of a hunting preserve area to determine the best area to be used for hunting and the best area to be used for fishing.

H. Laying out a campground

Competencies - students will be able to:
1. Figure carrying capacity of a site.
2. Design roads, buildings, campsites, trails, fireplaces, rubbish and sewage disposal facilities, benches, tables, safety regulation devices, signing, and lighting.
3. Develop a campground map including those features listed in number 2 above.

Learning activities:
1. Make a model campground to scale in the classroom including terrain, roads, buildings, campsites, trails, fireplaces, signs and vegetation. (Use paper mache or styrofoam for terrain).
2. Draw a map to scale of an existing or proposed campground.
3. Make trash receptacles for a city park.
4. Concrete construction class cast concrete park benches.
5. Estimate carrying capacity for parks in school district.
6. Make picnic tables for home or city picnic areas.

I. Planning hiking and riding trails

Competencies - students will be able to:
1. Locate trails considering scenery and grades.
2. Clear and mark trails.
3. Identify important sights and prepare accompanying guide.
4. Construct walking bridges and steps.
5. Locate rest areas.

Learning activities:
1. Draw map showing trail layout to include various ecology loops.
2. Make a trail through an interesting area.
3. Visit existing hiking and riding trails and note construction procedures.
4. Identify trees in a city park using plastic numbers, staples and guide maps.
5. Improve existing trails on slopes by building approved steps.
6. Students organize class trail ride through local saddle club.

J. Planning and operating a hunting preserve

Competencies - students will be able to:
1. Identify natural prairie grasses.
2. Select vegetation plantings specific to desired wildlife.
3. Establish living fences.
4. Identify the three necessities for wildlife propagation.
5. Design special features including a skeet range, rifle and pistol area and archery range.
6. List management practices to maintain existing wildlife cover.
7. Propagate wildlife.

Learning activities:
1. Student make a natural grass display by collecting grasses, such as big bluestem, little bluestem, Indian grass, switch grass, Reed's canary grass and others from roadsides.

2. List various species of wildlife and identify their cover and food preferences.
3. Plant living fences on home farms and around school grounds.
4. Students survey existing wildlife areas and identify vegetation.
5. Develop a "natural prairie" on home farm or school grounds and write a maintenance plan (include fertility practices, controlled burning, clipping, etc.).
6. Raise game birds and release in established wildlife areas.
7. Students may want to design their own skeet range, rifle and pistol area, or archery range after visiting an established area.

K. Planning sled and snowmobile areas

Competencies - students will be able to:
1. Identify possible sites.
2. Clear and mark trails.
3. Provide comfort stations.
4. Develop an equipment rental plan.
5. Provide for safety and patrolling of the area.

Learning activities:
1. Prepare plan for development of a sledding and snowmobile area.
2. Develop a snowmobile trail through a scenic area.
3. Plan an FFA snowmobile party.

Instructional Aids
1. Field trip to Bays Branch Wildlife Refuge; Guthrie Center, Iowa; overnight at Springbrook Conservation Education Center.
2. Visit a guest farm.
3. "New Opportunities in Rural Recreation," filmstrip or slides from USDA Photography Division.
4. "Community Lake," 16 mm. film, Environmental Film Service, League City, Texas.
5. "Tent Flaps and Flapjacks," 16 mm. film - USDA Photography Division.
6. "Rural Holidays," a new source of income for farmers, 16 mm. film, Environmental Film Service.
7. "Safety in Snowmobiling," slides; ISU film library.
8. "This is Your Land," 16 mm. film, ISU film library.
9. Field trip to a local guest farm, if available.
10. "The Wilderness Trail," film, ISU film library.
11. "Parks and People," film, Department of Natural Resources, Madison.
12. "A Place to Hunt," film, Department of Natural Resources, Madison.
13. Field trip to a KOA campground; Twin Acres at Colo; or Living History Farms near Des Moines; contact Chet Randolph.

Soil Conservation

Problem Areas
- A. Soil properties
- B. Land use classification

C. Maintaining soil fertility
D. Identifying erosion problems
E. Practices for controlling erosion and sedimentation
F. Utilizing soil management advisory services
G. Designing soil conservation structures
H. Managing soil conservation structures

Competencies and Learning Activities

A. Soil properties (see "Agronomic Science Guide")

B. Land use classification (see "Agronomic Science Guide")

C. Maintaining soil fertility (see "Agronomic Science Guide")

D. Identify erosion problems

Competencies - students will be able to:
1. Identify the two types of erosion problems and explain their effects on our environment.
2. Differentiate between the four categories of water erosion.
3. Identify factors causing erosion problems (percent of slope, length of slope, speed of water movement).
4. Estimate the percent of slope.
5. Identify those farming practices that contribute to wind erosion.
6. Correlate soil loss limitations in the conservancy law to soil classifications.
7. Label various parts of farm land to the land capability classes.

Learning activities:
1. Survey home farm to determine if farm operator rates as a good conservationist. Use the "Are You a Good Conservationist?" rating form and compare with other members of the class.
2. Evaluate home farm as to land capability classes.
3. Demonstrate the effects of soil conditions upon erosion. Measure runoff of small plots on a hillside using mulch tillage, primary tillage practices and secondary tillage practices.
4. Field trip to an erosion problem. (Determine the cause factors).
5. Construct a bulletin board on the cause conditions for wind erosion.
6. Take water runoff samples and compare differences in color and composition.
7. Using a flying service, fly the students over their farms, taking pictures and observing potential soil erosion problems. Try to complete after a rainfall.

E. Practices for controlling erosion and sedimentation

Competencies - students will be able to:
1. Select the conservation practices that will be effective in reducing erosion problems in a given area.
2. Recognize factors that determine the types of cropping systems to be used.

3. Prepare a crop rotation system to aid in soil conservation.
4. Correlate a cropping system with a given conservation practice.
5. Identify uses for dry spillways and concrete drops.

Learning activities:

1. Survey the community or farm identifying the good and bad soil conservation practices.
2. Have students take pictures of erosion control practices and structure in the school district.
3. Using soil survey maps and reports, determine if a farm is on schedule according to the soil conservation plan drawn up for the farm.
4. Take pictures in the community of the erosion problems at present. (List control procedures to prevent or eliminate.)
5. Conduct experiments using different vegetative covers to determine runoff conditions using the six basic conditions for selection of cover crop.
6. Prepare posters showing the various soil conservation practices and their benefits.
7. Draw a map of a farm and on each of the fields indicate the rotation plan to be followed.
8. Prepare a diagram of his home farm showing the conservation practices they would conduct and the windbreaks which should be formed.
9. Select the desirable species of trees to make up a planned windbreak. Do this by charting various tree species by comparing for (growth rate, disease resistance, climate adaptability, height, length of life and compatible with other species.)

F. Utilizing soil management advisory services

Competencies - students will be able to:

1. Interpret the various programs of the eight soil conservation agencies.
2. List the soil conservation agencies.
3. Explain the purposes or functions of the eight soil conservation agencies.
4. Select the program that will solve a given soil conservation problem.

Learning activities:

1. Field trips to the various soil conservation agencies.
2. Invite a soil conservation agent to explain farm mapping.
3. Solve a management problem related to soil conservation programs and practices. (Construction of a farm pond).
4. Field trip to various sites observing the layout and construction procedures of the structures.
5. Prepare bulletin boards or displays of programs conducted by the soil conserving agencies.
6. Students gain work experience with soil conservation personnel.
7. Given a field, have the students draw a soil type map under the supervision of a soil conservation person.

G. Designing soil conservation structures

Competencies - students will be able to:

1. Plan a parallel terrace system.
2. Lay out and run contour lines.
3. Plan a grass waterway. (Grade of land, percent slope, proper seeding, and shaping).
4. Select the best type of terrace to construct given a specific field situation.
5. Plan the procedures in laying out contour strips.
6. Determine the ratio of watershed area to pond surface.
7. Discuss the important points in using diversion ditches.
8. Explain the construction features of a good pond.
9. Determine rainfall frequency as it affects dam construction of farm ponds.
10. Estimate filling rate of a pond.
11. Plan a windbreak for the home farm.
12. Lay out a tile line.
13. Locate tile lines in the field

Learning activities:

1. Using surveying equipment and colored flags lay out a grass waterway.
2. Prepare a demonstration using growing flats to show the advantages of terracing. Sprinkle water over row crops in flats with different types of soil, catch the runoff and compare soil content in the runoff water collected.
3. Using surveying equipment determine the watershed area for a pond structure. See if the watershed area to pond surface ratio is workable.
4. Figure filling rates of a pond by estimating water runoff from a given watershed area using average rainfall amounts and percent runoff figures from the Soil Conservation Service.
5. Using surveying equipment and colored flags or stakes mark contour lines across a field.
6. Using watershed area information and pond size, have the students figure watershed to pond area ratio.
7. Develop a windbreak on the school grounds or on a student's farm. Consider an application for a grant of money from the Iowa Association of FFA.
8. Interview a tiler asking him the procedures and costs involved in tiling.
9. Select the size of tile to use for given situation.
10. Identify the material used in the construction of tiles.
11. Using surveying equipment layout tile lines on a given field at home.
12. Use a tile probe to locate tile lines in the field.

H. Managing conservation structures

Competencies - students will be able to:

1. Select the best grass or combination of grasses to be used on dams, terraces and grass waterways.
2. Select the best time to seed grasses in the structure and explain the reasons for their selection.

3. Maintain an effective windbreak by pruning trees, trimming hedges, replacing dead trees, removing dead wood, controlling weeds, etc.
4. Fertilize, control weeds and rodents, maintain grade of structure, renovate vegetation, and check tile outlets to maintain terraces, grassed waterways and ponds.

Learning activities:

1. Interview farmers asking their procedures and problems in maintaining soil conservation structures.
2. Conduct field trips to soil conservation structures making various population and species counts on grass varieties grown.
3. As an improvement enterprise have a student or group of students determine dead wood in trees and remove it safely and correctly to upgrade a windbreak or grove.
4. Conduct an experiment testing seeding differences between varieties using one week intervals to determine ideal planting time for highest germination and growth potentials.

Instructional Aids

1. Instructional Materials for Vocational Agriculture III. Texas A & M University.
2. Oklahoma Vocational Agriculture Education Basic Core Curriculum II. State Department of Vocational and Technical Education.
3. Les Johnson, Rockwell City. Conservation Field Day.
4. Erosion - film. ISU Film Library.
5. Look to the Road - film. ISU Film Library.
6. Using Soils as Ecological Resources - slides. Cornell University.
7. Soil Science Transparencies Masters. Illinois Vocational Agriculture Service.
8. County Soil Commission, speaker.
9. Ecology and Agriculture - filmstrip. Vocational Education Production, California Polytechnic State University.
10. Field trip to various conservation practice sites.
11. Watershed Management - filmstrip. Vocational Education Production, California Polytechnic State University.
12. Conservation is Everybody's Business Series - Saving the Soil - filmstrip. McGraw-Hill.
13. Erosion, Sedimentation and Environmental Quality - filmstrip. Cornell University.
14. Farmstead Windbreaks - filmstrip. Illinois Vocational Agriculture Service.
15. From the Ground Up - film. Soil Conservation Service.

Water Resource Management

Problem Areas

A. Selecting water sources
B. Estimating water demands
C. Storing water
D. Evaluating water quality
E. Improving water quality

F. Treating wastewater
G. Effects of liquid waste on streams and lakes

Competencies and Learning Activities

A. Selecting water sources

Competencies - students will be able to:

1. Identify the sources of water for home and industrial uses.
2. Compare the different ways that water is used by cities, urban areas, agribusinesses, and farmers.
3. Interpret information related to the procedures of finding underground water.
4. Explain the hydrologic cycle.

Learning activities:

1. Determine the average inches of rainfall in an acre and convert it to gallons.
2. Set up a rain gauge and keep a daily record of rainfall.
3. Locate the permanent rainfall check point in the area and determine the rainfall distribution pattern.
4. Interview a well-driller about the procedures in finding water.
5. Conduct a demonstration on water witching.
6. Make a bulletin board showing the hydrologic cycle and how it works.

B. Estimating water demands

Competencies - students will be able to:

1. Estimate the water needs for a farm family of four.
2. Estimate the water needs for a given subdivision of a city or community.
3. Calculate the water needs for a specific livestock facility or operation.
4. Determine ways of conserving water supplies.
5. Calculate the pumping capacities of a well.

Learning activities:

1. Read the home water meter at the same time daily for 30 days and determine the average daily water consumption of the family.
2. Locate three large agribusinesses using water in the community and determine their daily water requirements.
3. Survey the community determing areas where water is wasted because of overuse.
4. Students estimate the water needs of their farm by using a livestock inventory and compare this to the pumping capacities of their wells.

C. Storing water

Competencies - students will be able to:

1. Describe the effects of storage on water.
2. Identify and explain the factors which effect the quality of stored water.
3. Explain the different types of water loss when in storage.

4. Determine the relationship between rainfall runnoff and water storage.
5. Determine the need for stored water in various livestock operations.
6. Explain the different types of water storage systems.

Learning activities:

1. Set up a classroom demonstration using various sized containers filled with water and observe evaporation losses.
2. Conduct a demonstration showing loss of water through transpiration using sweet potatoes in containers of water set in the sunlight.
3. Prepare a bulletin board showing the effects of storage on water quality.
4. Survey the community concerning the various water storage systems available and ask the reason for their use or disuse and what they would change given the opportunity.

D. Evaluating water quality

Competencies - students will be able to:

1. Take a water sample.
2. Analyze a sample of water.
3. Interpret laboratory water test reports.
4. Identify potable water.
5. Determine sources of thermal pollution and measure its intensity.
6. Identify the types of water pollutants.

Learning activities:

1. Set up a demonstration of water in containers and run periodic bacteria counts.
2. Take samples of water for testing from different sources of water. (Town, river, lagoon, lake, tile line).
3. Practice determining pH, hardness, chlorination and nitrate content of fresh water samples.
4. Sample sources of drinking water in the school district and analyze or send to state health office and make comparisons of the results.
5. Survey the county to determine the variation of water quality standards.
6. Students take temperature of streams above and below agribusinesses and industries to identify thermal pollution.
7. FFA conduct a well-water testing program for a community service project.

E. Improving water quality

Competencies - students will be able to:

1. Identify and explain the various methods of water treatment.
2. Interpret legislation which will affect wastewater treatment. (Iowa Water Pollution Control Law)
3. Explain the methods or procedures in purifying a well.
4. Properly service a water softener.
5. Chlorinate a well.

Learning activities:

1. Survey the community identifying procedures in testing water

systems.

2. Interview the manager of the swimming pool about their procedures and tests conducted in water quality.
3. Interview city officials to determine water treatment procedures in the county.
4. Survey the community comparing the water treating procedures of farmers and urban developments.
5. Observe samples of water under the microscope and make comparisons of treated and untreated waters.
6. Demonstrate the steps involved in operation of a water softener. Show the differences in water before and after softening.

F. Treating wastewater

Competencies - students will be able to:

1. Identify and explain the different methods of treating wastewater.
2. Diagram a sewage disposal system for a given farm.
3. Identify the various kinds of agricultural wastes and describe how each pollutes the waters.
4. Recognize wastewater and trace its source.
5. Interpret health standards and local laws involved in the installation of a septic tank.
6. Distinguish between primary, secondary and tertiary treatments of waste water.
7. Identify properly and improperly operating septic tanks.
8. Recommend procedures to cause septic tanks to function properly.

Learning activities:

1. Diagram a wastewater collection system, explaining the structure and details. (Lagoons).
2. Visit selected wastewater treatment installations comparing the operation procedures. (Collection and treatment).
3. Check affluent from a wastewater lagoon for comparison with municipal waste treatment plant.
4. Sketch a waste disposal system for a farm feedlot operation.
5. Visit tile outlets to demonstrate properly and improperly functioning septic tanks.

G. Effects of liquid wastes on streams and lakes

Competencies - students will be able to:

1. Recognize visible indications of pollution in lakes and streams and describe probable causes.
2. Interpret Biological Oxygen Demand test results.
3. Explain the methods of recovery for polluted water.

Learning activities:

1. Observe streams above and below discharge points for visible effects of pollution.
2. Take water samples above and below potential pollution sources and analyze each sample making comparisons.
3. Take or have students make pictures of water pollution and set up a display. Emphasize improvement projects needed to control or prevent these problems.

4. Take various B.O.D. tests of streams to determine the oxygen supply and explain the reasons for the changes.
5. Prepare a bulletin board comparing the methods of recovery for waste or polluted waters.

Instructional Aids

1. Hach Chemical Kit for Water Testing. Hach Chemical Company.
2. Field trips to water testing laboratories.
3. Nothing Can Live Without Water - filmstrip. McGraw-Hill.
4. Well Water Pollution - transparancy masters. Dr. Thomas Hoerner, Agricultural Engineering Department, ISU.
5. It's Your Decision: Clean Water - film. Associate Films, Inc.
6. The River Must Live - film. Shell Film Library.
7. Conserving Water Resources Today - film. Bureau of Audio Visual Instruction.
8. Our Water Resources; Conservation Packet No. 3., 3M Company.
9. Field trips to water testing at swimming pools, sewage plants, city water systems.
10. Speaker from soft water businesses.
11. Ecology and Agriculture-Water - filmstrip. Vocational Education Production, California Polytechnic State University.
12. Water Pollution - filmstrip. Vocation Education Production.
13. Water - film. Modern Talking Picture Service.

Wildlife Management

Problem Areas:

A. Recognizing needs and the interrelatedness in all wildlife.
B. Identify species of birds and classify as upland, waterfowl, birds of prey, nuisance birds and endangered species.
C. Identify species of wildlife animals and classify as game animals, non-game animals, or endangered species.
D. Managing wildlife species
E. Establishing and managing wildlife preserves
F. Recognizing state and federal laws and agencies in wildlife conservation
G. Hatching game birds
H. Balancing rations of brood chicks
I. Disease and parasite control in game birds
J. Releasing game birds
K. Measuring wildlife populations

Competencies and Learning Activities

A. Recognizing needs and the interrelatedness in all wildlife

Competencies - students will be able to:

1. Identify and explain the three basic wildlife needs.
2. Explain the economic values of perpetuating wildlife.
3. Describe various ecological communities and ecosystems.
4. Draw a food chain.
5. Build a food pyramid.

Learning activities:

1. Give each student a species of wildlife and ask him to list the sources of food, water and cover for each. Have class do a cross-comparison to see which species have common needs.

2. Students report to class on various communities and their interdependence.
3. Draw food chain or a food pyramid for a type of wildlife.

B. Identify species of birds and classify as upland waterfowl, birds of prey, nuisance birds and endangered species.

Competencies - students will be able to:

1. Identify upland birds common to Iowa.
2. Identify waterfowl common to Iowa.
3. Identify birds of prey in Iowa.
4. Identify nuisance birds in Iowa.
5. List those birds common to Iowa that are on the endangered species list.

Learning activities:

1. Students take slides or films of wildlife in their natural habitat.
2. Using slides have an identification contest of types of wildlife by dividing the class into teams.
3. List birds of Iowa that are on the endangered species list.
4. As an interest gimmick have FFA sponsor a contest in the classroom to see who can bring in the longest pheasant tail feather during pheasant hunting season.

C. Identify species of wildlife animals and classify as game animals, nongame animals, or endangered species

Competencies - students should be able to:

1. Identify game animals in Iowa.
2. Identify Iowa's nongame animals.
3. List native Iowa animals on the endangered species list.

Learning activities:

1. Under the direction of a wildlife officer have students catch specimen, tag, record and release various wildlife species.
2. Produce a movie or set of slides on wildlife resources in the school district to present to service clubs.
3. Using slides, have an identification contest of types of wildlife by dividing the class into teams.
4. List wildlife native to Iowa found on the endangered species list.
5. Make plaster casts of animal or bird tracks and properly identify them.

D. Managing wildlife species

Competencies - students should be able to:

1. Determine crops that will provide cover for various wildlife species.
2. Provide food for animal and bird wildlife species.
3. Identify wildlife nesting areas.
4. Maintain a marsh for wildlife habitat.

Learning activities:

1. Build and stock bird feeders.
2. Build bird houses for various species of birds; demonstrate why they are so built and where they are to be placed.
3. Build and place squirrel and wood duck houses for home farm or school conservation areas.
4. Seed an area with various appropriate wildlife food and cover crops to observe types and habits of wildlife species.
5. Make a chart listing on one side wildlife species and across the top categories for preferred cover, foods and ideal nesting areas.
6. During hunting season have students identify food materials in crops of pheasants and intestines of wildlife animals.
7. Outline plans for improving the habitat in community, taking into consideration the three essentials of a good wildlife habitat.
8. Complete a marsh study inventory of all forms of life found in a marsh.

E. Establishing and managing wildlife preserves

Competencies - students will be able to:

1. Secure a site.
2. Determine type of preserve (private, state, federal).
3. Select species to be included.
4. Develop food and cover.
5. Control predators.
6. Plan a public relations program.
7. Identify uses of dogs and specialized equipment in management practices.

Learning activities:

1. Outline a plan for development of a wildlife preserve and use the FFA proficiency award area of "Fish and Wildlife Management" as a guide.
2. Set up a class demonstration on the use of hunting dogs to locate game species.
3. Visit a hunting area or farm and have students list game facilities. Students may make individual surveys of the area and work up a plan for improving the facility.
4. Make a complete plan for a farm or a neighbor's farm (200 acres minimum) indicating the type of game for the farm, management practices to provide cover, food, and facilities, and plan for hunting permits.
5. Develop a plan and signs for notifying the public of locations where hunting is or is not permitted.

F. Recognizing state and federal laws and agencies in wildlife conservation

Competencies - students will be able to:

1. Determine areas where hunting is permitted.
2. Differentiate between a wildlife refuge and wildlife preserve.
3. Secure aid from state and federal agencies.
4. Interpret state hunting regulations.
5. Obtain wildlife propagating permits.

Learning activities:
1. County game officer may go over hunting rules and regulations for various species.
2. Visit a wildlife refuge and ask the manager to discuss hunting regulations.
3. Have students secure sources of funds and aid to help develop farm as a wildlife preserve.
4. Conduct a tour of students' farms that have enrolled in wildlife conservation as an improvement enterprise. Ask SCS, ASCS or extension wildlifer to travel along and offer suggestions to students.

G. Hatching game birds

Competencies - students will be able to:
1. Identify egg sources.
2. Locate potential markets for hatched game.
3. Prevent line breeding problems.
4. Properly operate an incubator.

Learning activities:
1. During haying season ask farmers of the community to be aware of eggs in nests uncovered. Work with conservation officer in incubating these eggs.
2. Purchase and hatch eggs from commercially available sources.
3. Use incubated chicks released to provide outcrossing propagation.
4. Develop a plan for hatching a given lot of game bird eggs considering light, heat, humidity, and incubation period.
5. Draw and label the parts of the reproductive system of game birds.

H. Balancing rations of brood chicks

Competencies - students will be able to:
1. List nutrient requirements of chicks.
2. Recommend field sources.
3. Formulate a balanced ration for chicks.

Learning activities:
1. Conducting feeding experiments with chicks to demonstrate the importance of balanced rations.
2. Review turkey feed tags in order to determine suitability for chick rations.
3. Draw and label the digestive tract of game birds.

I. Disease and parasite control in game birds

Competencies - students will be able to:
1. Classify diseases as contagious or noncontagious.
2. Recognize nutritional diseases.
3. Recognize inherited diseases and defects.
4. Treat broken bones, bruises and lacerations.
5. Identify internal and external parasites.
6. List symptoms, prevention and treatment for common diseases and parasites.

7. Provide for general sanitation of facilities.

Learning activities:
1. Prepare a chart of common diseases, their symptoms, prevention and treatment.
2. Ask a veterinarian to perform a post-mortem examination of diseased birds or animals as a class demonstration.
3. Have students set high standards of health of chicks incubated before they are released.
4. Ask veterinarian to help students develop skills in treating broken bones, bruises, or lacerations.

J. Releasing game birds

Competencies - students will be able to:
1. Determine proper age and size for releasing.
2. Release during the correct season.
3. Estimate stocking rate.
4. Handle birds correctly.
5. Provide adequate food and cover.

Learning activities:
1. Develop a brochure that includes a checklist before a farmer can be considered a recipient of FFA game birds.
2. Establish feeding stations for released game birds.
3. Ask recipients of FFA game birds to make observations of birds and prepare a news story encouraging others to establish proper wildlife cover.

K. Measuring wildlife populations

Competencies - students will be able to:
1. Take a population census.
2. Inventory wildlife food and cover supplies.
3. Capture and mark wild animals.
4. Analyze wildlife population data using: frequency table, frequency polygon, histogram, mean, median, and range.

Learning activities:
1. Conduct a weekly strip census or road census for a given location and species of wildlife over a period of one month.
2. Interview a wildlife officer and determine when and for which species of wildlife the census is taken in your state.
3. Interview a wildlife officer and determine how the annual hunting kill for a given species of wildlife is determined.
4. Using wildlife census data, construct or calculate the following:
    - frequency table
    - frequency polygon
    - histogram
    - mean
    - median
    - range
5. Cruise wildlife habitats and evaluate the food and cover crop conditions.

Instructional Aids

1. "Some Game Birds of North America," slides, USDA, Photography Division, No. C-172.
2. "We Share This Land," USDA, Motion Picture Service.
3. "Big Game Management on Public Lands," No. C-159, slides, Photography Division, USDA.
4. "Sharing our Land with Wildlife," ISU, Media Resources Center, S0177, slides.
5. "Big Land Animals of North America," ISU, Media Resources Center, NS 1561, film.
6. "Cry of the Marsh," ISU, Media Resources Center, NS 1685, film.
7. "Nature's Half Acre," ISU Media Resource Center, film, NS5803.
8. Demonstration incubator brooder.
9. County conservation officer.
10. Plaster of paris.
11. Wildlife reserve in school district.
12. Field trip to a marsh.
13. ISU Extension Wildlifer.
14. Local veterinarian.
15. 35 mm. camera with telephoto lens.
16. Endangered species list, National Wildlife Federation.
17. Conservation officer's duck wing display.

EVALUATION

1. Student learning contracts; designating the activities that must be completed.
2. Evaluation form to be completed on special learning activities. Use community leaders to aid in evaluation.
3. Farm visits to productive enterprises, improvement enterprises, and supplementary practices.
4. Class tours to student enterprises.
5. Class evaluations of individual and team class presentations. (For example: demonstrations, bulletin boards, talks, displays, and interviews.)
6. Entering FFA Proficiency Awards in local, sub-district, district, state, regional and national contests. Areas include: Forestry Management; Soil, Water and Air Management; Outdoor Recreation; and Fish and Wildlife Management.
7. Students enter Soil Conservation Speaking Contests.
8. Chapter entry in FFA "Building Our Communities" program,
9. Use University of Pennsylvania "Management of Forest Resources Test" as a pre-test and post-test to measure student gain.
10. Observe home demonstration plots of natural grasses. Include numbers of species included and growth changes as shown by student transect studies.
11. Plans for improvement enterprises as written in students' Iowa Vo-Ag Record Book. Each student have at least one in the area of agricultural resources and conservation.
12. Plans for supplementary practices as written in students' Iowa Vo-Ag Record Book. Each student have at least a minimum of three in the area of agricultural resources and conservation.
13. Conduct a fish, game bird and wildlife identification contest.
14. Student records of fish produced from home pond. Student goal might be 50 pounds per year.
15. Accuracy of one week weather prediction contest. Base predictions on temperature high, low and median; precipitation amount; barometric changes, and humidity readings.
16. Evaluation of water in students' home farm ponds for pH, hardness, oxygen content, weeds temperature, muddiness and depth.

17. Income per acre from timber and Christmas tree production. Set goal of $1200 per year net income.
18. Conduct tree identification contest.
19. Skill sheet on tree planting techniques.
20. Germination percentages of pine seed in flats.
21. Comparison of student's ability to age trees with results of tree expert.
22. Timber inventory compared with sawmill operators estimate.
23. Measure land area by various methods and compare results with instructor's standard.
24. Evaluate accuracy of feedlot registration form.
25. Compare pacing and steel taping to chaining accuracy.
26. Written legal description of home farm.
27. Record of income derived from recreational facility.
28. Results of soil judging contest.
29. Home water sample test results.
30. Students' tests of water samples compared with known test results.
31. FFA Well Water Testing Program. Evaluate on number of wells tested, number of good quality, number needing improvements, and the number recommended for abandonment.
32. Percent hatch of wildlife eggs set.
33. Census information on wildlife on the home farm.
34. Kinds and acreage of wildlife cover on home farm.

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Milwaukee, Wisconsin 53201

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750 3rd Avenue
New York, N.Y. 10017

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1040 Washington Building
15th Street and New York Ave. N.W.
Washington, D.C. 20005

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Committee on Public Affairs
1271 Ave. of the Americas
New York, N.Y. 10020

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1313 East 60th St.
Chicago, Illinois 60637

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605 3rd Avenue
New York, N.Y. 10016

9. American Water Works Association
2 Park Ave.
New York, N.Y. 10016

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Regional Film Center
561 Hillgrave Ave.
LaGrand, Illinois 60525

11. Bay's Branch Wildlife Refuge
Guthrie Center, Iowa 50115

12. Bureau of Audio Visual Instruction
1327 University Ave.
P.O. Box 2093
Madison, Wisconsin 53715

13. California Polytechnic State University
Vocational Education Production
San Luis Obispo, California 93401

14. Colorado Mining Association
402 Majestic Bldg.
290 S. 16th Street
Denver, Colorado 80202

15. Conservation Education Officer
U.S. Forest Service
P.O. Box 3623
Portland, Oregon 97208

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Instructional Materials Services
Department of Education
Room 201, Stone Hall
Ithaca, New York 14850

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65 East South Street
Chicago, Illinois 60601

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Lucas State Office Building
Des Moines, Iowa 50319

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Technology Transfer
Washington, D.C. 20460

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Department 37
P.O. Box 7305
Kansas City, Missouri 64016

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P.O. Box 907
Ames, Iowa 50010

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Division of Noise Pollution Control
2200 Churchill Road
Springfield, Illinois 62706

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2200 Churchill Road
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Division University Extension
Champaign, Illinois 61820

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Urbana, Illinois 61820

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60 East 42nd St.
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Ames, Iowa 50010

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State Office Building
300 4th St.
Des Moines, Iowa 50319

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2314 Helmer St.
Sioux City, Iowa 51103

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223 Curtiss Hall
Ames, Iowa 50010

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Civil Engineering Department
394 Town Engineering Building
Ames, Iowa 50010

34. Iowa State University
Extension Forestry
253 Bessey Hall
Ames, Iowa 50010

35. Iowa State University
Media Resources Center
121 Pearson Hall
Ames, Iowa 50010

36. Iowa State University
Dr. Robert Moorman
Extension Wildlifer
Sciences Building
Ames, Iowa 50010

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Dr. Burl Parks
Landscape Architecture
Ames, Iowa 50010

38. Iowa State University
Publications Distribution Center
Printing and Publications Building
Ames, Iowa 50010

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Press Building
Ames, Iowa 50010

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State Department of Health
Box 344
Clear Lake, Iowa 50428

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1326 Waukegan Road
Glenview, Illinois 60025

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Milwaukee, Wisconsin 53212

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Portland, Maine 04104

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Education Department
Muscatine, Iowa 52761

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P.O. Box 8718
Friendship International Airport
Baltimore, Maryland 21240

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Education Services
Box 3100
St. Paul, Minnesota 55101

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330 West 42nd St.
New York, N.Y. 10036

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P.O. Box 154
Jefferson City, Missouri 65100

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200 3rd Ave. S.W.
Cedar Rapids, Iowa 52406

51. National Association of Conservation Districts
Environment Film Service
P.O. Box 855
League City, Texas 77573

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950 3rd Avenue
New York, N.Y. 10022

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Coal Building
1130 17th St. N.W.
Washington, D.C. 20005

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Station K
Atlanta, Georgia 30324

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711 14th St. N.W.
Washington, D.C. 20005

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Education Service Section
1412 16th St. N.W.
Washington, D.C. 20036

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Raleigh, North Carolina 27601

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Stillwater, Oklahoma 74074

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East Alton, Illinois 62024

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Room 201, 2120 Fytte Road
Columbus, Ohio 43210

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300 Park Ave.
New York, N.Y. 10022

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33 West Grand Ave.
Chicago 10, Illinois 60610

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150 East 52nd St.
New York, N.Y. 10022

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450 North Meridian St.
Indianapolis, Indiana 46204

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823 Federal Building
Des Moines, Iowa 50309

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Curt Powell, Director
Guthrie Center, Iowa 50115

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7515 N.E. Ankeny Road
Ankeny, Iowa 50021

68. StackPole Books
Cameron & Kelker Streets
Harrisburg, Pennsylvania 17105

69. Standard Oil Division
American Oil Co.
Farm & Home Department
Box 4040
St. Paul, Minnesota 55116

70. Statistical Reporting Service
Agricultural Statistician
Federal Building Room 855
210 Walnut St.
Des Moines, Iowa 50309

71. St. Martins Press, 175 Fifth Ave.
New York, N.Y. 10010

72. Successful Farming
Reader Service
Des Moines, Iowa 50309

73. Texas A & M University
Vocational Instructional Service
F.E. Box 182
College Station, Texas 77843

74. Tuberculosis & Respiratory Disease Association
(see local medical people)

75. U.S. Department of Agriculture
Motion Picture Service
Office of Information
Washington, D.C. 20250

76. U.S. Department of Agriculture
Office of Information
Washington, D.C. 20250

77. U.S. Department of Agriculture
Photograph Division
Office of Information
Washington, D.C. 20250

78. U.S. Department of Interior
Federal Water Pollution Control Administration
U.S. Government Printing Office
Washington, D.C. 20250

79. U.S. Government Printing Office
Superintendent of Documents
Washington, D.C. 20402

80. Water Pollution Control Federation
3900 Wisconsin Avenue
Washington, D.C. 20016

81. Weston Publishing Co., Inc.
Racine, Wisconsin 53401

82. Wildlife Management Institute
709 Wire Bldg.
Washington, D.C. 20005

83. Wildlife Society
Suite S-176
3900 Wisconsin Ave. N.W.
Washington, D.C. 20016

84. Wiley & Son, Inc.
605 Third Ave.
New York, N.Y. 10016

85. Wisconsin, University of
Department of Natural Resources
208 Agriculture Hall
Madison, Wisconsin 53701

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Agribusiness and Natural
Resource Education

Curriculum Guide

OCCUPATIONAL EXPERIENCE IN AGRICULTURE

A joint publication of:

IOWA STATE UNIVERSITY
of Science and Technology
Department of Agricultural Education
Ames, Iowa 50010

and

DEPARTMENT OF PUBLIC INSTRUCTION
Career Education Division
Grimes State Office Building
Des Moines, Iowa 50319

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Grimes State Office Building
Des Moines, Iowa 50319

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SOURCE OF CURRICULUM GUIDES

The following ten curriculum guides in agribusiness and natural resources are available as a set from the Department of Public Instruction:

Agribusiness and Natural Resource Education

Animal Science

Agronomic Science

Agricultural Mechanics

Farm Business Management

Agricultural Supplies and Services

Agricultural Products Processing and Distribution

Horticulture

Agricultural Resources and Conservation

Occupational Experience in Agriculture

Order from Information and Publications Services Section, Department of Public Instruction, Grimes State Office Building, Des Moines, Iowa 50319.

Price, $5.00 per set of ten curriculum guides listed above. Please send remittance with order.

FOREWORD

This curriculum guide is one of ten developed for use by vocational and technical agribusiness instructors in planning instructional programs to meet the needs of their students. Elementary teachers and instructors in other subject matter areas at the secondary level may find the guide of value in introducing principles of career education in their instructional programs. Although much of the material is designed for use at the secondary or post-secondary levels, many of the competencies may be introduced at the awareness or exploratory levels of career education.

Instructors in multiple-man departments at the secondary level and in post-secondary schools may organize nine-week or mini courses around the units and problem areas outlined in this guide.

Appropriate competencies and learning activities have been provided for each problem area. The competencies listed are those determined in previous studies as needed by persons employed, or becoming employed in agriculture. Instructional aids and references are listed for each unit.

It is assumed that only partial attainment of some competencies listed can be done at the secondary level. The competencies may not be mastered until the student has completed additional preparation at the postsecondary, young or adult class, or collegiate levels. It is assumed that "hands on" and occupational experience will be provided with class and laboratory instruction at all levels.

Evaluation of occupational experience should be based largely upon attainment of the competencies listed in this guide, and on the application of them as students participate in their individual occupational experience programs.

Allocations of units and of instructional time in the four-year sequence of courses at the secondary level are presented in the curriculum guide titled, Agribusiness and Natural Resource Education. Also presented are suggested activities for teachers at the kindergarten through sixth grade level, and suggested outlines of subject matter to be included in exploratory programs at the junior high school level.

Curriculum Guide, Occupational Experience in Agriculture was prepared by Lee R. Daub, Vocational Agriculture Instructor, Albia, Iowa; and by James L. Patton, Vocational Agriculture Instructor, Sac City, Iowa (Committee Chairman).

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Much credit is due the members of a steering committee which met for three sessions in advance of the workshop to determine the areas to be involved and the format to be followed. The following were members of the steering committee:

State Consultant Staff in Career Education - Emeron Dettmann, Gerald Lamers and Elwood Mabon.
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Vocational Agriculture Instructors - Garland M. Ashbacher, Tom Hensley, G. Leslie Johnson, Lewis Lauterbach, Dennis Lettow, James L. Patton, Thomas A. Silletto, Frederick A. VanLoh and Joe R. White.

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OCCUPATIONAL EXPERIENCE IN AGRICULTURE

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GENERAL OBJECTIVES

Students completing instruction in the occupational experience program will have strengthened their interests in agricultural occupations and have developed abilities to (1) analyze their future employment opportunities in agriculture; (2) analyze the contribution of agriculture to the economy of the local community, state and nation; and (3) to secure employment and perform successfully in an agricultural occupation.

UNITS

Planning a Career
Locating an Agricultural Opportunity and Entering an Occupation
Orientation to an Occupation
Importance of the Individual
Legal Considerations - Farm and Nonfarm
Occupational Success
Farming Program and Personal Finance

Planning a Career

Problem Areas

A. Self-analysis
B. Securing occupational information
C. Trends in occupational change
D. Influence of education on opportunities

Competencies and Learning Activities

A. Self-analysis (see Agricultural Supplies and Services Guide)

Competencies - students will be able to:

1. Recognize physical abilities and limitations.
2. Identify intellectual capabilities.

Learning activities:

1. Administer test for physical fitness.
2. Each student list personal physical handicaps.
3. Each student describe three physical activities most enjoyed.
4. Discuss high school performance in relationship to occupational capabilities.
5. Use test scores of the guidance counselors.

B. Securing occupational information

Competencies - students will be able to:

1. Secure job titles and descriptions.
2. Appraise manpower needs.
3. Select a farm or job occupation cluster.

Learning activities:

1. With the Dictionary of Occupational Titles assign each student a series of numbers to search for titles and outline the information found.

2. List the names of occupations in the local area.
3. Each student compose three occupational descriptions.
4. Assign the students to use the other curriculum guides for occupational names (clusters).
5. Students review and lead discussion of film.
6. Assign student to discuss each chart of "Tomorrow's Jobs."
7. Organize a class symposium with each student gathering background material on one farm and two nonfarm businesses. (All of these should be different businesses and discussion will revolve around the comparative advantages and disadvantages).
8. Students invite resource people who have background in several agricultural businesses for classroom comparisons.

C. Trends in occupational change

Competencies - students will be able to:

1. Assess effect of automation and technology.
2. Compare the economic changes in farming and agricultural business.
3. Analyze occupational trends.

Learning activities:

1. Use local businessmen with long experience to relate changes of their businesses.
2. Students bring antiques or pictures for class contest or discussion.
3. Working with the local newspaper, secure old news copy for examples of prices and pictures.
4. Students are to search current agricultural publications for articles of past, present and future agriculture change.
5. Students review "Tomorrow's Jobs."
6. Use "Miracle in the Supermarket."
7. Refer students to the other curriculum guides for materials of specific trends.

D. Influence of education on opportunities

Competencies - students will be able to:

1. Examine the problem of student drop-outs.
2. Determine the educational needs of farm and agribusiness clusters.
3. Compare types of education and training.

Learning activities:

1. Use "Jobs for the 70's" slide series.
2. Use "Occupational Outlook Handbook" for cluster needs.
3. Review pamphlet on "Iowa, Where Industry and Agriculture Meet".
4. Consult with guidance counselors for local situations of drop-outs.
5. Divide students into groups to summarize the agriculture offerings of trade schools, area schools, colleges and universities.
6. Implement "Iowa Guidance Survey" materials on overheads.

Instructional Aids

1. New Uses of Farm Products - film. ISU Film Library.
2. Jobs for the 70's - Slideset. U.S. Department of Labor.

Locating an Agricultural Opportunity and Entering an Occupation

Problem Areas

A. Supervised production agricultural experience selection
B. Agribusiness selection
C. Job application and interview
D. Enterprise and job goals
E. Financing projects and businesses

Competencies and Learning Activities

A. Supervised production agricultural experience selection

Competencies - students will be able to:

1. Identify productive projects and explain the differences between productive, improvement and supplementary projects.
2. Identify improvement projects and explain how they fit into the supervised agricultural experience program.
3. Identify supplementary projects and explain how they can be used to increase competencies in the related productive project.
4. Evaluate performance of the productive enterprises using various efficiency factors.
5. Survey home farm situation for better use of facilities and resources in planning future programs.

Learning activities:

1. Students will develop a program of productive enterprises which will be continued until they are established in farming or engaged in off-farm agriculture.
2. The student will develop and use a list of supplementary practices to increase his skills and knowledge in the productive enterprises.
3. Show slides of enterprise programs and improvement practices of upperclassmen or recent graduates, and have them explain their supervised agricultural experience programs to the class.
4. Take a field trip to the home of a student who has an outstanding supervised agricultural experience program and let him conduct a tour of his program.
5. Use the FFA proficiency awards program as goals for students to work toward.

B. Agribusiness selection

Competencies - students will be able to:

1. Survey the home community to identify possible occupational opportunities.
2. Analyze the job situation as it relates to the student's interests.
3. Analyze his own abilities and skills that will help qualify him for an occupation.
4. Make a selection of the agribusiness he will enter.

Learning activities:

1. Each student visit two agribusinesses in the community and compile a list of occupational titles and the duties and responsibilities of each worker.
2. Field trip to one or more of the following agribusinesses:
    - (a) Livestock feed processing plant
    - (b) Tractor or machinery manufacturing plant
    - (c) Agricultural chemical manufacturing
    - (d) Livestock and grain markets
    - (e) Packing house
    - (f) Seed corn processing center
3. Each student list at least five personal characteristics that will help him in securing a job.
4. The student will report to the class the salable skills that might be useful in seeking employment.

C. Job application and interview

Competencies - students will be able to:

1. Compile a neat, complete resume (personal data sheet).
2. Write a letter of application asking for an interview.
3. Fill out a job application form.
4. Conduct himself in an acceptable manner at a job interview.
5. Fill out a social security card application form.

Learning activities:

1. Student will compile a resume or personal data sheet on himself to send to prospective employers.
2. Each student will write a letter to a prospective employer asking for a job interview.
3. Have students procure and fill out two job application forms from local agribusiness employers.
4. Students will obtain application forms from the state employment service and fill them out.
5. Have a local agribusiness man conduct a job interview with one or more class members as a class demonstration.
6. Divide class into groups of three, let one student be the interviewer, one the person to be interviewed and the third person an observer. After ten minutes, rotate positions and after an additional ten minutes rotate again giving each student an opportunity to play each role. The remainder of class time can be used for small group discussion or class discussion.
7. Each student apply for a social security card if he does not already have one.

D. Enterprise and job goals

Competencies - the student will be able to:

1. Analyze his home farm situation to determine what productive enterprises will fit into the overall farming system.
2. Set goals in terms of scope of the enterprise.
3. Plan long term goals that will help establish him in production agriculture.
4. Select an entry level job that will start him toward his overall career choice.

5. Determine the salary range and position he plans to hold in ten years.

Learning activities:

1. Make a list of all production enterprises on the home farm and give a five minute report to the class.
2. Each student will fill in a worksheet showing present projects and what he plans to add each year for a five year period.
3. Former students with an outstanding supervised production agricultural experience plan could speak to the class and show how they met their goals.
4. Have students give a report on the occupation of their choice and discuss such things as:
   - (a) Salary
   - (b) Working conditions
   - (c) Advancement
   - (d) Benefits
   - (e) How to get started in the field
   - (f) Training and educational requirements
   - (g) Duties and responsibilities
5. Have students compile a list of job titles that will pay a salary in the range that they are seeking.

E. Financing enterprise programs and businesses

Competencies - the student will be able to:

1. Determine the cost of getting started in his chosen enterprises or business.
2. Compile a list of all costs that will appear during the first two years.
3. List and estimate all returns during the first two years.
4. Make a budget for the first two years using the costs and returns previously estimated.
5. Arrange for financial aid to cover excess costs for the two-year period.

Learning activities:

1. Have each student make an inventory of all assets on hand that will be of value in financing his enterprises or business.
2. A field trip to a bank, PCA or finance office to see how a loan is arranged.
3. Assist the student and parent in obtaining a loan.

Instructional Aids

1. Dynamic Careers Through Agriculture--film, ISU Film Library.
2. Vocations in Agriculture--film, ISU Film Library.
3. Slide set of students supervised agricultural experience program prepared on the local level.
4. Transparency set on careers, Iowa Vo-Ag Teachers Association.

Orientation to an Occupation

Problem areas:

- A. Development of enterprise and job plans
- B. Learning the business
- C. Meeting the challenge of opportunity
- D. Enterprise and job evaluation
- E. Interrelationships among jobs and enterprises
- F. Human relations

Competencies and learning activites

A. Development of enterprise and job plans

Competencies - the student will be able to:

1. Select the types of livestock programs which will best suit his farming program.
2. Design a cropping plan for maximum profit to complement his livestock enterprises.
3. Plan with parents, landlord and banker the opportunities for establishment in farming.
4. Develop a budget for expansion of his farming program.
5. Prepare a written agreement with parents and landlord to complement his farming program.
6. Prepare an agreement with the employer stating what each will provide while on the job.
7. Select a time schedule that will fit into both his and the employers schedule.
8. Determine what he expects to learn or to become more skilled in while on the job.
9. Analyze his ability to improve the business he will work for.

Learning activites:

1. Compare the advantages and disadvantages of various types of livestock.
2. Develop a management plan for at least two types of livestock the student chooses to work with.
3. Using the Midwest Planning Manual, the students should decide on the kinds of crops and livestock which most efficiently complement each other.
4. Survey the home farm situation and plan with each student individually.
5. Each student, using reasonable projections, plan possible expansion and financing for the next three years.
6. Each student develop a written agreement with a parent and/or landlord. This will include any financial, labor and other business items.
7. The student and employer will outline an agreement of what each expects to do during the experience program.
8. The student and employer will work out a time schedule when the student is available for work, and when the employer or another employee can supervise his progress.

9. Student lists the abilities he expects to become proficient in during his experience program and discusses with his employer a program to develop those abilities.
10. Students make up a list of things he can contribute to the business and discuss them with the employer.

B. Learning the business

Competencies - the student will be able to:

1. Operate equipment and perform skills related to a farming program.
2. Use recommended sources for purchase of livestock, seed, machinery and supplies.
3. Develop judging abilites in livestock, meats and crops.
4. Maintain an inventory record of total farm enterprises.
5. Prepare specific rations for livestock.
6. Recognize health problems in the livestock enterprise and instigate remedial programs.
7. Take soil tests and fertilize for maximum production.
8. Select tillage and planting methods for optimum yields.
9. Repair and maintain farm machinery for efficient operation.
10. Design a financial plan for the farming program.
11. Adapt to local business procedures.
12. Use business forms provided by the company.
13. Work efficiently with other employees.
14. Outline the chain-of-command within the business and follow through to the head office of the company.
15. Determine the major products or services provided by the company.
16. Describe the raw materials purchased by the company to be used in processing.
17. Explain the overall value of the business to the community in terms of employment, services provided and community growth.
18. Fill a vacancy in the business and perform the duties of that position if the need arises.

Learning activities:

1. Students check the field loss of a combine in soybean and corn fields.
2. Field trip to local farm to castrate, vaccinate, earnotch and clip needle teeth of swine.
3. Attend a nearby purebred or test station sale of hogs.
4. Visit several feed dealers to review their types of feeds and prices.
5. Field trips to local farms, buying stations or packing plants to judge livestock.
6. Participate in county, district and state judging contests.
7. Visit with local banker for assistance to determine the type of inventory record needed for financing.
8. Formulate feed rations for 400-600, 600-900 and 900-1,200 pound steers.
9. Design a total health program for lambs from birth to market.
10. Compile a list of poultry health problems, symptoms and cures.

11. Class members demonstrate soil testing and calculate fertilizer needs from test recommendations.
12. Use commercial literature to show variety and rationale for various tillage and planting equipment.
13. Using machinery manuals have each student demonstrate adjustment of machines.
14. Invite a local banker to review a financial statement need to finance farming.
15. Accompany each student and his parents to a selected bank to plan financing of a growing farm program.
16. Student and employer review business procedures and the student write a report on how business affairs are handled.
17. Secure order blanks, inventory forms, job slips and other busisness forms from the employer and have students fill out the forms.
18. See unit on human relations in Agricultural Supplies and Services Guide.
19. Using FFA officers from local, state, and national levels, have students discuss the responsibilities of lower level officers to higher level officers, and higher level to lower level officers.
20. Using the last year's business report, have students list products and services offered by the business.
21. Tour local agribusinesses engaged in processing, and follow raw materials being taken in to the completed product.
22. Have students visit the public relations department of a business and report on what the business is doing for community development.
23. Assistant or junior FFA officers can be elected to carry on the jobs of the office in the absence of the regular officer.

C. Meeting the challenge of opportunity

Competencies - the student will be able to:

1. Accept assigned tasks as a challenge and apply his best effort in doing the work.
2. Be proud of his accomplishments in the overall operation of the business.
3. Strive to have each job completed be representative of the quality of work he can do.
4. Seek opportunities to present new ideas or innovations that will improve the efficiency of the business.
5. Take advantage of opportunities to improve his position in the business.
6. Improve present skills and learn new skills that will broaden his usefulness in the business.

Learning activities:

1. Using some routine job done in the school shop, ask each student to list three ways of describing the job, telling what he is doing in a way that makes the task seem challenging and useful.

2. Have students give class reports on their supervised agriculture mechanics laboratory projects to show pride in their workmanship or accomplishments.
3. Display work completed by several students where it can be seen by all vocational agriculture classes and other students and faculty.
4. Award merit points to students who submit ideas that will improve the Vocational Agriculture Department.
5. Use FFA proficiency awards program to motivate students to improve their supervised experience programs.
6. Use local agricultural mechanics, soils, livestock and meats judging contests to permit students opportunities to improve and practice their skills.

D. Enterprise and job evaluation

Competencies - the student will be able to:

1. Apply efficiency factors in analyzing livestock and crop enterprises.
2. Develop a record keeping system for the farming program or for each enterprise.
3. Identify the most profitable and least profitable enterprise in the farming program.
4. Organize work to conserve time and effort.
5. Accept the responsibility given by the supervisor.
6. Set priorities on tasks to be done based on the importance of the task.
7. Recognize one's creative ability and apply it to the occupation.
8. Conform to the standards and routines used by his employer.

Learning activities:

1. List examples of at least three efficiency factors for each enterprise.
2. Use a computer record or enterprise record system to analyze enterprises. (yield per acre-return per $100 of feed fed - net income per acre.)
3. Use a farm management problem to identify profitable enterprises using efficiency factors.
4. Use records of past Iowa or American Farmers as examples of efficient management.
5. Students sketch the area where they will be working and arrange all materials, tools and other items commonly used in a manner that will save steps and time in doing the daily work.
6. Use of FFA officers, committee chairmanships and committee work to improve the student's ability to assume responsibility.
7. Have students list things of importance in their lives according to their priorities.
8. Students discuss job standards with other employees.
9. Use creativity tests (see the art instructor) to discover those students with creative ability.

10. Use evaluation forms from Ohio State Univesity.

E. Interrelationships among jobs and enterprises

Competencies - the student will be able to:

1. Estimate the amount of time needed to successfully manage each enterprise.
2. Determine the farm organizations which will assist the student and his farming program.
3. Recognize the way that the student's farming program will affect other family members.
4. Adjust outside activities to avoid conflict with employment. (See unit, Importance of the Individual, problem area on leisure time.)
5. Arrange for daily transportation to and from work.
6. Select clothing suitable for the type of work being done.

Learning activities:

1. Outline the jobs involved with each enterprise. Arrange them in chronological sequence and assign amounts of time needed.
2. Each student select a farm organization and orally report on its function, membership, services to members and cost of membership.
3. Invite a representative of the organizations in the community to describe their purposes.
4. Encourage class member to discuss their farming programs, specifically emphasizing the coordination or operation of their programs with those of parents or landlords.
5. Students list all sports, hobbies and activities that will require time and attention, and determine the amount of time spent on each during the week.
6. Students use a budget to figure costs of owning an automobile, and compare with the costs of other available means of transportation.
7. Students plan a wardrobe of work clothes and compute the cost.

F. Human relations

Competencies - the student will be able to:

1. Evaluate his own personal appearance.
2. Develop a self-checklist of physical characteristics important in making a good appearance.
3. Evaluate his communications ability. (See unit - Importance of the Individual.)
4. Maintain satisfactory working relationships with fellow employees, employer and customers.

Learning activites

1. See unit on Human Relations in Agricultural Supplies and Services Guide.

Instructional aids

1. Individual training plan forms, Ohio State University.
2. Sample loan agreement forms, Ohio State University.
3. Sample loan agreement forms, Illinois Vo-Ag Service.

4. Training agreement forms, Ohio State University.
5. Employee evaluation forms, Ohio State University.
6. Vocational Agriculture record book, The Interstate.
7. Manpower Development Program - 6 Filmstrips. Kent Feeds, Inc.
8. Vu Graphs - Selling from Basics to Handling Objections. Kent Feeds, Inc.
9. Business Procedures - Transparencies. Clemson University.
10. Orientation to and Planning for the Supervised Occupational Experience Program - Transparencies. Clemson University.
11. Organizations and Functions of Agribusiness - Transparencies. Clemson University.

Importance of the Individual

Problem Areas

A. Work attitude
B. Efficient managers and workers
C. Leadership throught the FFA
D. Using leisure time
E. Communication with others

Competencies and Learning Activites

A. Work attitude

Competencies - students will be able to:

1. Identify the important relationships between the employee and other employees, the employer, the business, and the community.
2. Distinguish the differences among unwilling, unready, uncooperative, undependable, conscientious and cooperative workers.
3. Recognize quality work.
4. Demonstrate by example open-mindedness and flexibility.

Learning activitites:

1. Students invite a school administrator or businessman to explain what is important in employee relations.
2. Use role playing to show the undesirable and desirable work attitudes.
3. Arrange a student evaluation form and tour a factory, a business, and a farm to find good and poor quality work.
4. Use two students, each taking opposing views, have them leave the room to prepare their arguments. Instruct the rest of the class to be continuously opposing one of the students to test his flexibility and reaction.

B. Efficient managers and workers

Competencies - students will be able to:

1. Plan and set specific goals.
2. Assist with scheduling and assign priorities.
3. Know the job and perform it correctly.
4. Comply with safety rules and regulations.
5. Understand how the employee relates to the business.
6. Introduce new methods in the business.

Learning activities:

1. Students divide into two groups with one group assuming the role of management and the other group the role of the employee. Using farming or other agribusiness, have each group establish aims and goals.
2. Each student schedules his activities for the next day.
3. Each student assumes the management of a farm or agribusiness for one month. First make a list of activities and then determine priorities.
4. Students design a job or enterprise evaluation form.
5. Students fill out the forms for performance as it relates to their enterprises or jobs.
6. Touring the shop area, have each student list the various areas with safety problems and precautions needed.
7. Touring a local elevator, have each student list areas with safety hazards.
8. Students contact a local lawyer to review with the class the legal implications of safety.
9. Instructor demonstrate fire safety (fumes from a container of gas), machine safety (cloth on a drill press), eye safety (old safety glasses), air pollution (leaving the exhaust fans off), and electrical safety (charts of hazards).
10. Students select and explain their roles throughout the day with parents, school, job, farm, other students, athletic team, music group, brothers and sisters and other daily contacts. Have each student examine the ways these relations could be improved.
11. Students analyze ways which coaches or advisors involve students for better individual and group performance.

C. Leadership through the FFA

Competencies - students will be able to:

1. Demonstrate the following parliamentary procedure abilities: to lay on the table, to take from the table, to rise to a point of order, to reconsider, to refer to a committee, to make a motion, to make an amendment, to leave the chairman's station, to suspend the rules, to move to adjourn, to amend an amendment, and appeal the decision of the chair.
2. Plan, prepare and present a public speech.
3. Demonstrate speaking extemporaneously.
4. Cooperate with other students in presenting a demonstration (activities and skills).
5. Write news articles.
6. Chair and work as a member of committees.
7. Lead group discussions.
8. Evaluate public images and the use of public relations.

Learning activities:

1. Students organize teams to demonstrate parliamentary procedure abilities.
2. Elect or appoint officers and demonstrate opening ceremonies and parliamentary abilities.
3. Each year students give reports in class (each report should be longer, more technical and with fewer notes).

4. Using speeches from the national and state conventions, have the students analyze and identify the structure (specifically the strongest and weakest points).
5. Given a general subject, allow each student two days to find background material. On the third day announce a specific title and allow 10-15 minutes preparation for an extemporaneous speech.
6. Design and present two demonstrations of skills.
7. In cooperation with the skill demonstration, have each student chair one demonstration and work as a team member of the other.
8. Write a news article concerning a student's own accomplishments, and an article to inform the community about FFA activities (good for FFA Week).
9. Identify the components of a good discussion. Lead a discussion on a subject selected by the student.
10. Survey the community concerning the local FFA chapter's image.
11. Following the survey reorganize and implement more effective FFA relations.
12. As committees, formulate FFA Week activities. (Also use BOAC activities and other community service projects.)

D. Using leisure time

Competencies - students will be able to:

1. Place work and leisure in the proper perspective.
2. Select activities leading to worthy use of leisure time.
3. Formulate leisure time self-improvement and community betterment activities.
4. Understand personal leisure needs.

Learning activities:

1. Class discussion on life's priorities (family, work, church, friends and hobbies).
2. Survey businessmen for their reasons for vacations.
3. List and explain the reasons for student's hobbies.
4. Discuss: "Should your hobby interfere with your job?"
5. Write one page report on either of the following: "Improving yourself with leisure" or "Leisure time used in community activities."

E. Communications with others

Competencies - students will be able to:

1. Communicate with understanding.
2. Ask questions to clarify unclear instructions.
3. Develop abilities of a good listener.
4. Increase ability to write clearly and concisely.
5. Demonstrate public speaking ability.

Learning activities:

1. Have a student look at a picture or scene and describe what he sees to the next student. Use this relay around the class until the last member gives his description aloud.

2. Practice giving directions with time at the end of each to improve descriptions.
3. Play a tape recording of sounds and ask the students to name the sounds.
4. Write two letters; one to invite a speaker to class, and the other to explain the use of a tool. After correcting the letters have them rewritten for more clarity.
5. Refer to problem area - leadership through FFA.

Instructional Aids

1. Second Effort - Film. Kent Feeds.
2. All Jobs are Important - Film. Kent Feeds.
3. Employee evaluation form - Ohio State University.
4. Life's Higher Goals - Tape. Iowa Grain and Feed Association.
5. Charts or transparencies of electrical safety from "Understanding Electricity" (1973 4-H Guide).
6. How to Motivate Your Employees - Tape. Iowa Grain and Feed Association.
7. Speeches from the state and national conventions.
8. Parliamentary procedure worksheet.
9. FFA paraphernalia.
10. Video tape machine for demonstrations and speeches.
11. National FFA Week materials. Future Farmers Supply Service.
12. Brotherhood of Man - Film. Farmland Industries.
13. Scene or picture.
14. Ideas for two different letters.

Legal Considerations - Farm and Nonfarm

Problem Areas

A. Child labor law
B. Withholding taxes and social security
C. Minimum wage - student learner
D. Insurance
E. Liability

Competencies and Learning Activities

A. Child labor law

Competencies - students will be able to:

1. Explain the provisions of the child labor law concerning students under 16 years of age.
2. Identify those occupations declared hazardous by the Secretary of Labor.
3. Explain the provisions and restrictions placed on students employed during school hours.
4. Identify the exemptions among student learners on the list of hazardous occupations.
5. Explain the limits on total hours that can be worked by student learners in one day and in one week.
6. Obtain an age certificate and explain how it is to be used.

Learning activities:

1. Have students paraphrase the 1938 Fair Labor Standards Act as it applies to their age group.

2. Using the list of hazardous occupations as a guide, have students cite people they know who work in each occupation.
3. Have students list all activities of each day and find the total hours they are busy with school, hobbies, athletics, work, etc.
4. Each student make up a schedule of hours he could work and not be in violation of the hour limit of the child labor law.
5. Have each student secure an age certificate if he is under 18 years of age.

B. Withholding taxes and social security

Competencies - students will be able to:

1. Explain the withholding of income tax and deductions on the federal level.
2. Explain the withholding of income tax and deductions on the state level.
3. Use tax tables to predict take home pay after federal and state income taxes.
4. Explain how the self-employed person pays income tax.
5. List social security withholding rates for employees and the part paid by the employer.
6. Explain the maximum that one can earn in each quarter and not have to pay social security tax.
7. Describe the upper limit on wages above which social security is no longer withheld.
8. Explain benefits to the individual which could be paid by social security.

Learning activities:

1. Using the student's family as an example have each class member determine the amount of deduction provided for the total family.
2. Each student using his own salary, or one selected by the instructor, compute take home pay after state and federal income tax.
3. Have each student compute the amount of tax he would pay if he were self-employed and when and how it would be paid.
4. Using the same salary, have student figure social security tax that is withheld.
5. Students compute the social security tax paid by their employer for them and total the two amounts.
6. Ask students to cite examples of people they know who are receiving social security benefits and the reason they are receiving them.

C. Minimum wage - student learner

Competencies - students will be able to:

1. Explain the present minimum wage rate.
2. List those occupations not covered by the minimum wage law.
3. Explain the penalty for employers not complying with the law.
4. Define what a student learner is.
5. Explain the minimum wage for student learners.

6. Explain a student learner can legally be paid less than full-time employee.
7. Explain the responsibility of the employer to the student learner.

Learning activities:

1. Have students look up the present minimum wage law and any pending legislation which may change it.
2. Divide class into groups and have each group check the wages paid by local employers of people who are covered by the minimum wage law and also those who are not covered.
3. Students list what they expect to gain from their programs and decide if the learning experience is worth the loss in pay as student learners.

D. Insurance

Competencies - students will be able to:

1. Explain why it is advantageous to both employer and employee for the employee to be insured.
2. Explain what is meant by group life insurance and family group life insurance.
3. Explain the conditions that must be met in order to collect disability insurance.
4. Explain the limits on workman's compensation in dollars per week and length of time that it can be paid.
5. List the qualifications in order for a person to collect workman's compensation.
6. Determine whether the employer, employee or both pay for hospitalization insurance.
7. Explain the importance of liability insurance to the employer and to the self-employed.

Learning activities:

1. Students figure living expenses for two years for a family of four assuming the father dies.
2. Discuss the group insurance policy used in the school or in a local business.
3. Students compute the amount of workman's compensation that would be paid at various salary levels.

E. Liability

Competencies - students will be able to:

1. Define liability and explain how a business can protect itself.
2. Explain one's role in the business in terms of what he could be held liable for.
3. Explain what is meant by a tort.
4. Decide who would be liable if the student were injured on the job.

Learning activities:

1. Students discuss recent court cases where liability of a person or persons was decided upon.

2. Student, instructor and employer write up an agreement stating who is responsible for the training and supervision of the student.

Instructional Aids

1. Materials from various insurance agents.
2. Bulletin Number 21, Labor Laws of Iowa.
3. Newspaper articles of court cases.
4. Cassette tapes by Neil Harl on estate planning.
5. Income tax forms.

Occupational Success

Problem Areas

A. Making decisions.
B. Farm, occupational and civic organizations.
C. Code of ethics.
D. Continuing education and training programs.

Competencies and Learning Activities

A. Making decisions

Competencies - students will be able to:

1. Recognize pertinent facts and use them in making decisions.
2. Use both opinion and fact, but acknowledge the differences.
3. Make decisions and follow-through to determine validity of judgment.

Learning activities:

1. The class assumes they are managing the FFA concession stand or fruit sales. Give a series of problems to the class and ask each member to write his decisions and reasons.
2. Review the management decisions of the No. 1 example. Show the reasons on a transparency and in class discuss and point out the differences because of the use of fact or opinion.
3. Use FFA committees to emphasize decision making and follow-up evaluation.

B. Farm, occupational and civic organizations

Competencies - students will be able to:

1. Identify organizations in the community and their activities.
2. Define ways an organization can improve an individual, a farm, a job, and a community.
3. Distinguish the kinds of organizations needed in farming or in a job.
4. Explain reasons for some organizations to be more active and effective than others.

Learning activities:

1. Invite farm organization representatives to describe the purposes of their organizations.
2. In small groups discuss ways of using commodity groups.

3. Construct a bulletin board series to illustrate differences among civic groups.
4. Itemize the service and civic groups in the community. Determine their areas of service. Inquire about the need for cooperation with the FFA.
5. Identify the leaders in the community. Each student name five influential people in the community power structure.

C. Code of ethics

Competencies - students will be able to:
1. Describe practices of fair play and good conduct.
2. Demonstrate by example ways of evaluating good or fair ethics.
3. Design a code of ethics to live by.

Learning activities:
1. Each member describe what he likes about his friends; also describe traits which he dislikes. Discuss characteristics which are related to ethics.
2. Students describe how they can improve their friendship capability.
3. Discuss the FFA Code of Conduct. (Are there any items which the members find hard to use?)
4. Each student draw-up his own code of ethics and describe to class how it could apply to his family, friends and work.

D. Continuing education and training programs

Competencies - students will be able to:
1. Choose education or training needed following high school.
2. Recognize the amount of knowledge and training needed in farming to be progressive.
3. Outline types of training needed while employed on jobs.

Learning activities:
1. Encourage students to visit with college, trade school, and area school representatives.
2. During summer employment discuss education plans with each student's family and accompany the student to possible schools.
3. Field trip of students to an area school to look at facilities and consider offerings. (juniors)
4. Whenever on judging trips, convention trips, or on other travels, be aware and visit schools near the route of travel.
5. Students make tape recordings with businessmen and farmers in the community concerning their opinions on the value of education.
6. Each student select a job and report on the kind of educational background needed while employed on the job. Describe specifically the kinds of shortcourses or schools needed.

Instructional Aids
1. Materials from various farm and civic organizations.
2. Materials from trade schools, area schools and colleges.
3. Careers In Agriculture - Film. Coronet Instructional Films.
4. Vocations In Agriculture - Film. Gilbert Altscul Productions, Inc.

Farming Program and Personal Finance

Problem Areas
- A. Planning insurance purchases
- B. Planning budgets
- C. Using consumer credit wisely
- D. Providing for savings and investments
- E. Understanding and paying taxes
- F. Planning estates
- G. Keeping financial records

Competencies and Learning Activities

A. Planning insurance purchases

Competencies - students will be able to:
1. Describe the differences among life, health, and accident insurance.
2. Relate the values of liability insurance for your farm, business, home, and automobile.
3. Construct a farm, business, and home policy including fire and extended coverage.
4. Recognize a reliable insurance agency.

Learning activities:
1. Invite an insurance agent to discuss types of insurance with the class and point out the advantages and disadvantages of each kind.
2. Students analyze and describe the type and cost of liability insurance for the FFA Chapter.
3. Invite the superintendent to discuss with the class the types of fire, liability and extended coverage insurance carried by the school.
4. Identify the characteristics which insurance agencies or agents possess which make them successful.
5. Students outline the types of insurance they need or will need in the future. Specifically require an approximate cost estimate and when the students intend to use the insurance program.

B. Planning budgets

Competencies - students will be able to:
1. Estimate household expenses, housing, clothing, food, major purchases, and other expenses.
2. Plan toward emergencies.
3. Itemize farm and business expenses by months and for the year.

4. Use cash flow information to refine budgets.

Learning activities:

1. Each student itemize how he presently spends his money.
2. Have the students project themselves into a job out of high school or beginning a full-time farming program. Identify what the personal and business expenses will be and calendarize the items for 12 months.
3. Record books, financial statements, or cash flow sheets will be helpful in outlining areas of concern.
4. Students may need to work in pairs to reach a real list of costs of personal expenses.
5. Together with parents, or with a home farm cash flow sheet, budget a farming program for 12 months.
6. Use computer record information to determine the value of a cash flow analysis.

C. Using consumer credit wisely

Competencies - students will be able to:

1. Distinguish sources of credit.
2. Calculate actual interest rates.
3. Outline reasonable repayment plans.
4. Build and maintain a good credit rating.

Learning activities:

1. Have students report to the class the uses and advantages of the different credit sources. (Bank, savings and loan institutions, charge accounts, company credit, credit cards, PCA, FHA, and Federal Land Bank).
2. Students design a bulletin board showing the flow of money through our economy.
3. Use an interest rate worksheet. Follow this with an example of a credit source with local merchants. (feed dealers, appliance store, car dealer, machinery dealer)
4. Invite a local lender to outline lending policies and specifically emphasize recommendations for repayment.
5. Field trip to a credit bureau or credit collections agency.
6. Invite personnel from the area credit bureau credit source to speak to the class.

D. Providing for savings and investments

Competencies - students will be able to:

1. Distinguish among savings institutions.
2. Identify investment opportunities.
3. Select investments which complement the farming program.
4. Recognize ways to build an investment program.

Learning activities:

1. List savings institutions available and the type of savings and investment programs they use.
2. Students bring a weekly paper to identify and discuss listings on the financial page.

3. Develop a chart or bulletin board of the development of price trends of an investment.
4. Field trip to a stockbroker for further discussion of investment purchases, costs, and sources of information.
5. Using the student's present farming program together with his plans and goals, have each student select what he thinks would be his best investment, worst investment, and give reasons.
6. Each student examine his budget from the problem area, Planning Budgets, and fit in specific types of savings and investments. Examine the concepts of different saving and investment programs for different individuals as their farming programs and careers change.

E. Understanding and paying taxes

Competencies - students will be able to:
1. Use income tax forms.
2. Calculate real estate taxes.
3. Identify licensing fees.
4. Explain other taxes and fees.

Learning activities:
1. Follow the outline of Understanding Taxes by the Dept. of the Treasury.
2. Field trip to the courthouse to visit county offices for explanation of property taxes calculation, mortgage fees, marriage licenses, drivers licenses, and estate taxes.
3. Special reports by each student would help identify and summarize peculiar taxes and fees.

F. Planning estates

Competencies - students will be able to:
1. Describe procedures in the transfer of property.
2. Identify legal instruments such as wills and contracts.
3. Recognize the importance of providing for heirs.

Learning activities:
1. Invite a lawyer to describe the common ways to transfer property.
2. In a field trip to the courthouse visit the recorder's office for explanation and examples of legal documents.
3. Ask each student to visit with his parents about the methods which the family property will be transferred.
4. Use case studies of family losses because of poor estate planning.
5. Secure a copy of a will for each student to examine.

G. Keeping financial records

Competencies - students will be able to:
1. Maintain an accurate record of farming program finances and job income and expenses.
2. Use records in planning, borrowing, and evaluating progress.
3. Develop a more mature way to handle money.

Learning activities:

1. Records can be reviewed and charted with the student on his file folder four times each year.
2. As jobs progress and farming programs become established, individually review with each student his progress in total earnings, increased inventory, and financial growth.
3. Each student design a loan opportunity with his own situation and invite local lenders to interview, evaluate, and grant or decline the loan. (Many times this may be an actual loan need - not just a class activity.)
4. With juniors or seniors, review with them their financial goals and also their past financial management. Make an effort to point out their strong methods of money management. Help them plan improved records for their own uses to assist in their money management.
5. Invite a prosperous farmer or businessman to explain to the class the importance of records.

Instructional Aids

1. Insurance brochures from local agencies.
2. Record books, financial statements, and cash flow sheets.
3. A New Look at Budgeting - Filmstrip. Money Management Institute of Household Credit Corporation.
4. Take A Look - Transparencies. CUNA Mutual Insurance Society.
5. Interest worksheet.
6. The Responsible Consumer - Public Affairs Pamphlet No. 453.
7. Your World and Money - Filmstrip. Money Management Institute of Household Finance Corporation.
8. Credit Concepts - Filmstrip. Instructional Material Center, Wisc.
9. You and Your Community Bank - Filmstrip. The Now Corporation.
10. Weekly newspaper.
11. Individual student files.
12. American and State Farmers records.

EVALUATION

Planning a Career

1. Physical fitness test.
2. Dictionary of Occupational Titles worksheet.
3. Establish criteria for the number and kind of antiques, pictures or stories found.
4. Determine the completeness of the summaries of various school offerings.

Locating an Agricultural Opportunity and Entering an Occupation

1. Pre-test and post-test.
2. Home farm visits and job visits.
3. Worksheet on supervised experience program.
4. Vo-Ag recordbook.
5. Goals reached on efficiency factors of various enterprises.
6. Results of job applications and interviews.

Orientation to an Occupation

1. Pre-test and post-test.
2. Determine the completeness of plans for the supervised farming program.

3. Home farm visits and job visits.
4. Evaluation of work agreement and plans of employment.
5. Student and employer agreement.
6. Judging scores in contests and proficiency award applications.
7. Inventory of total farm program.
8. Completion of business forms.
9. Farm management problem.

Importance of the Individual

1. Evaluation form for work quality.
2. Evaluation form for job performance.
3. Scheduling of an agribusiness or farm.
4. Reports following field trips.
5. Performance of parliamentary procedure and speeches.
6. News articles written by students.
7. Community survey completeness.
8. Paper concerning leisure time activities.
9. Letters written by students.

Legal Considerations, Farm and Nonfarm

1. Pre-test and post-test.
2. List of hazardous occupations.
3. Student's work schedule.
4. Tax tables worksheet.
5. Identification of social security benefits.
6. Quiz on taxes.
7. Completeness of list of living expenses.
8. Reasons for liability insurance.

Occupational Success

1. Work on committees.
2. Bulletin boards on civic groups.
3. Code of ethics.
4. Class reports.

Farming Program and Personal Finance

1. Pre-test and post-test.
2. Insurance needs report.
3. Cash flow sheets.
4. Class reports.
5. Interest rate worksheet.
6. Reports following speakers and field trips.
7. Investment choices.
8. Class quizzes.
9. Identification of property transfer procedures.
10. Job and farming program records.
11. Loan design.
12. Design of money management plan.

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7. ALCOA INFORMATION AIDS CATALOG, Aluminum Company of America.
8. APPLYING FOR A JOB, Illinois Vo-Ag Service.
9. APPLICATION FOR A CERTIFICATE TO EMPLOY A STUDENT LEARNER, Form WH-205, Bureau of Labor, Des Moines, Iowa.
10. BETTER COMMUNICATIONS IN SMALL BUSINESSES, SBA 1.12:7, Small Business Administration.
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Iowa State University
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Alexandria, Virginia 22309

11. *Hoard's Dairyman*
Ft. Atkinson, Wisconsin 53538

12. Internal Revenue Service
Kansas City, Missouri 64106

13. The Interstate Printers and Publishers
1927 North Jackson Street
Danville, Illinois 61832

14. Iowa Grain and Feed Association
201 Shops Building
Des Moines, Iowa 50309

15. Iowa Vocational Agriculture Teacher's Association
Instructional Aids Service
Agriculture Engineering Department
Iowa State University
Ames, Iowa 50010

16. Iowa State University Media Resources Center
121 Pearson Hall
Iowa State University
Ames, Iowa 50010

17. Kent Feeds, Inc.
Education Department
Muscatine, Iowa 52761

18. The Labor Commissioner
Bureau of Labor
State House
Des Moines, Iowa 50319

19. McKnight and McKnight Publishing House
Box 854
Bloomington, Illinois 61701

20. Michigan Association of Teachers of Vocational Agriculture
Services Committee
Educational Services
Michigan State University
East Lansing, Michigan 48823

21. New Holland Farm Equipment Company
Contact local dealer

22. New Idea Company
Public Relations Department
AVCO New Idea Farm Equipment Division
Coldwater, Ohio 45828

23. New York Life Insurance Company
51 Madison Avenue
New York, N.Y. 10010

24. Ohio Agricultural Education Curriculum Materials Services
Room 201
2120 Fyffe Road
Columbus, Ohio 43210

25. Pennsylvania State University
Department of Agricultural Education
University Park, Pennsylvania 16802

26. Pocket Books, Inc.
1 West 39th Street
New York, N.Y. 10018

27. Prentice-Hall, Inc.
Education Division
Englewood Cliffs, New Jersey

28. Ralston-Purina Company
St. Louis, Missouri 63199

29. Small Business Administration
New Federal Building
210 Walnut Street
Des Moines, Iowa 50309

30. Toastmasters International
P.O. Box 10400
Santa Ana, California 92711

31. United States Steel Corporation
Director of Public Relations
71 Broadway
New York, N.Y. 10006

32. University of Illinois
Visual Aids Service
Division of University Extension
Champaign, Illinois 61820

33. University of Illinois
Vo-Ag Service
University of Illinois at Urbana Champaign
434 Mumford Hall
Urbana, Illinois 61801

34. University of Missouri
Instructional Materials Laboratory
8 Industrial Education Building
University of Missouri-Columbia
Columbia, Missouri 65201

35. University of Wisconsin
Instructional Material Center
Madison, Wisconsin 53706